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OUTSOURCING THE HELICOPTER COMBAT SUPPORT MISSION ABOARD MILITARY SEALIFT COMMAND SHIPS: A COST COMPARISON STUDY

By

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June 2000

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Recently the Department of Defense and the Navy have sought new avenues for achieving the national security of the United States within the scope of available resources. In an attempt to meet savings objectives, the Navy has looked toward outsourcing the Helicopter Combat Support (HC) mission aboard Military Sealift Command (MSC) ships. After several evaluations with civilian helicopter companies, the Navy awarded Geo-Seis Helicopters, Inc. a three-year contract for ship-to-ship and ship-to-shore logistics services.

This thesis evaluates the current outsource contract and compares costs of the contract to those of the HC community. The purpose was to determine the level of savings and the differences in services provided. Within the course of this study, the total in-house cost was established for the HC squadrons flying the H-46 aircraft. This cost was then fractured down to equal the services provided by the contractor to determine the Most Efficient Organization.

This thesis determined that the current outsource contract does provide a small savings but at the costs of increased risk in not meeting surge requirements for unplanned contingencies. Furthermore, inherent risks are associated with the inability to not fill personnel billets within other areas of the Navy through reduced manning levels due to outsourcing.

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Recently the Department of Defense and the Navy have sought new avenues for achieving the national security of the United States within the scope of available resources. In an attempt to meet savings objectives, the Navy has looked toward outsourcing the Helicopter Combat Support (HC) mission aboard Military Sealift Command (MSC) ships. After several evaluations with civilian helicopter companies, the Navy awarded Geo-Seis Helicopters, Inc. a three-year contract for ship-to-ship and ship-to-shore logistics services.

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I. INTRODUCTION

A. BACKGROUND

Since the end of the Cold War, defense budgets have on the whole declined and the Department of Defense has sought new avenues for achieving the national security of the United States within the scope of available resources. Furthermore, the costs associated with maintaining a strong technologically superior national defense have increased. Thus, the cost of maintaining a strong defense has defense leaders reviewing A-76 studies and current core-competencies in the effort to reduce spending. Strategic sourcing of what was once considered inherently governmental is being considered in the quest to determine optimal structure in ensuring the best value and maximized efficiency.

In an attempt to meet savings objectives, the Navy has looked toward outsourcing the Helicopter Combat Support Mission aboard Military Sealift Command ships. Kaman Aerospace Industries and the Navy first performed test and evaluation in 1995 and 1996 with the K-MAX helicopter aboard MSC ships. In the spring of 1997, the Navy and Evergreen Helicopters Inc. agreed to a six-month trial aboard the MSC ship USNS Saturn utilizing two Huey helicopters. Recently, the Navy has awarded Geo-Seis Helicopters, Inc. a three-year contract with an option for two more years to provide two SA-330J Puma helicopters and crews for ship-to-ship and ship-to-shore logistics services for the Navy's combat stores ships in the Atlantic Fleet.

In recent times, Helicopter Combat Support Squadrons have been the primary source at sea for performing vital vertical replenishment (VERTREP); crucial passenger, mail, and internal cargo transport; and continuous search and rescue. While at homeguard, Helicopter Combat Support Squadrons provide drone recovery, special

operations aerial training and basic fleet support to the Navy, Army, and Air Force. For the most part, this has been accomplished via the H-46 Sea Knight helicopter. Currently, there are five such squadrons within the United States Navy that fly the H-46 Sea Knight. Two operational squadrons are located in Norfolk Virginia (HC-6, HC-8), one is located in Guam (HC-5) and the remaining two are in San Diego (HC-3, HC-11). Of the two in San Diego, one squadron (HC-3) is the fleet replacement squadron.

B. OBJECTIVES AND RESEARCH QUESTIONS

This thesis explores two objectives. The first objective is to determine what is the cost of conducting Helicopter Combat Support Missions aboard Military Sealift Command ships. A secondary research question for this first objective is to determine what are the requirements associated with helicopter logistics support aboard MSC ships. The second objective is to compare whether the in-house costs of conducting logistics support exceeds the current outsource contract costs. A secondary research question within the scope of this objective is to ascertain what additional factors the Government should consider when reviewing the outsourcing contract.

C. SCOPE AND LIMITATIONS

1. Scope

The study is divided into three parts. First, the relative importance of the helicopter logistics support mission to the U. S. Navy is shown by analyzing operational requirements and missions. Second, an in-house cost analysis calculates operating costs

as well as military personnel costs. Finally, the in-house cost is compared to the commercial contract for helicopter support aboard MSC ships.

2. Limitations

Aircraft operating costs were determined using Visibility and Management of Operating and Support Costs (VAMOSC) data from the Navy Center for Cost Analysis. Currently, VAMOSC provides the best data available for this purpose. However, there are limitations to VAMOSC data, which are listed in Appendix A.

D. METHODOLOGY

A variety of references as well as personal interviews were used to accumulate data for this thesis. Historical data were collected from the Center for Naval Analyses to help determine HC requirements aboard Combat Logistics Force ships. Additionally, interviews were conducted with those associated with the Helicopter Combat Support Community to quantify the manning and aircraft requirements aboard MSC ships. The Naval Center for Cost Analysis and the Defense Finance and Accounting Service provided archival data to determine H-46 helicopter operational costs and established the cost for military personnel respectively. Last, the commercial contract issued by the Military Sealift Command was analyzed for comparison in the cost benefit analysis.

E. ORGANIZATION OF STUDY

This thesis is divided into five chapters, including this introduction. Chapter II provides general background information necessary for understanding the remaining chapters. Such information concerns outsourcing issues and definitions, core functions of the Helicopter Combat Support Community, and the mission and logistics requirement of the Helicopter Combat Support Community aboard Military Sealift Command ships. Chapter III presents and analyzes the data. The chapter examines the total cost of the Helicopter Combat Support Squadrons that operate aboard Military Sealift Command ships. Chapter IV compares the current outsourcing contract costs with the escalation rates of those associated Helicopter Support Squadrons. The chapter explores concepts whereby the Navy utilizes business practices similar to that of the contractor. The final chapter summarizes the research presented in this thesis. In addition, the chapter will provide recommendations for further exploration required to completely investigate this issue.

II. BACKGROUND

A. INTRODUCTION

This chapter provides general background information necessary for the reader to better understand the issues pertinent to this study. The chapter is divided into three areas: information concerning outsourcing issues and definitions, core functions of the Helicopter Combat Support Community, and the mission and logistics requirement of the Helicopter Combat Support Community aboard Military Sealift Command ships.

B. OUTSOURCING ISSUES

As noted in the Vice President's Third Report of the National Performance Review, "Common Sense Government: Works Better and Costs Less" (September 1995). Americans want to "get their money's worth" and want a Government that is more businesslike and better managed [Ref. 1]. With that in mind, the DOD as well as the Navy have sought ways to improve the programs and costs of those programs through commercial participation. Like the best companies and organizations in the United States, DOD has embarked on a systematic and vigorous effort to reduce costs and improve performance. In fact, "the DOD has committed to putting more than 200,000 jobs up for competition with the private sector through 2005." [Ref. 2] Outsourcing and privatization are two methods the Department of Defense is actively pursuing to cut costs and become more efficient.

The DOD has established three conditions that must exist for activities to be considered for outsourcing or privatization. First, commercial firms must be capable of performing the activity in question. Additionally, the activity to be outsourced or

privatized cannot be considered a core-competency. Second, competition for the activity must exist. The factors that lie behind the concepts of competition force organizations to improve quality, increase efficiency, and reduce costs. Last, activities will only be outsourced or privatized if the commercial firm can improve performance or lower costs resulting in best value for the government. [Ref. 3]

1. Definitions

> **Outsourcing** is the operation of a commercial activity for the Government by a contractor. Essentially, it is characterized by the award of a contract for a specific period of time (typically one year) with two or more renewal option periods. The Government retains ownership and control over operations in the activity through surveillance of the contractor. The primary method for outsourcing commercial activities is through competition between the Government and private sector (i.e., under the A-76 program, comparing the cost of in-house to contract performance to determine the most efficient and cost-effective mode of operation). [Ref. 4]
>
> **Privatization** differs from outsourcing in that the Government divests itself of a commercial activity and purchases goods and/or services from commercial sources. The Government may specify quality, quantity, and timeliness requirements for purchased goods and services; however, it has no control over the operations of the activity. The same activity may also provide these goods and services to other customers. [Ref. 5]

2. Fundamentals

Generally, the greatest reason for outsourcing is to reduce operating costs. By outsourcing, an organization attempts to take advantage of another company's business practices and achieve savings. Outsourcing not only cuts costs, but also allows the organization to concentrate on its core-competencies. This allows the organization to focus its resources on its primary missions and build further efficiencies. Additionally,

the private firm now tasked with producing or providing the service, can build upon its core-competencies and create economies of scale, creating further efficiencies.

As stated previously, the primary objectives of outsourcing are cutting costs and producing savings. Through competition in the outsourcing initiative, DOD looks to increase efficiency in its operations to gain more value for every dollar spent. Historically, 20 percent or greater savings have been realized, regardless of who wins, when there is competition between the public and private sector to perform commercial oriented activities [Ref. 6].

Figure 2.1 indicates savings through competition resulting in reduced operating costs. Such savings have highlighted DOD's continued observance for future potential outsourcing initiatives.

	Competitions Completed	**Average Annual Savings ($M)**	**Percent Savings**
Army	510	470	27%
Air Force	733	560	36%
Marine Corps	39	23	34%
Navy	806	411	30%
Defense Agencies	50	13	28%
Total	2138	1477	31%

Figure 2.1 Savings Yield from Competition [Ref. 7]

Outsourcing is also a great management tool for improving an organization's focus on its primary operations, while allowing non-core operations to be assumed by an outside expert. Consequently, the organization can redirect its resources toward activities which yield a greater return in serving the customers. The point being that outsourcing

creates efficiencies within the organization. At a time when the DOD is faced with financial and personnel constraints, becoming more efficient allows the DOD to free up additional resources to maintain readiness and modernize for the future.

The reasons for outsourcing vary from organization to organization. However, similarities can be drawn between the private sector and the government sector. Previously, two reasons for outsourcing (cost and efficiency) were mentioned. Other reasons for outsourcing can be drawn from Figure 2.2 below.

Organizationally Driven Reasons

- Enhance effectiveness by focusing on what you do best.
- Increase flexibility to meet changing business conditions.
- Transform the organization.
- Increase product and service value and customer satisfaction.

Improvement Driven Reasons

- Improve operating performance.
- Obtain expertise, skills and technologies that may not be available.
- Improve management and control.
- Improve risk management.
- Acquire innovative ideas.
- Improve credibility and image by associating with superior providers.

Financially Driven Reasons

- Reduce investments in assets and free up resources for other purposes.
- Generate cash by transferring assets to the provider.

Revenue Driven Reasons

- Gain market access and business opportunities through provider.
- Accelerate expansion by tapping into provider's capacity, processes, and systems.
- Expand sales and production capacity during periods when expansion could not be financed.
- Commercially exploit existing skills.

Cost Driven Reasons

- Reduce costs through superior provider performance and the provider's lower cost structure.
- Turn fixed costs into variable costs.

Employee Driven Reasons

- Give employees a stronger career path.
- Increase commitment and energy in non-core areas.

Figure 2.2 Reasons for Outsourcing [Ref. 8]

3. Impediments to Outsourcing

Outsourcing is not always the cure all and does have some disadvantages to be considered. Current literature evaluates a number of specific risks, which cause firms to experience problems [Ref. 9]. Some disadvantages to be considered, include the misperceptions about the services to be provided, supplier leverage, suffering interruptions to supply, and an inability to deal with surge capacity requirements.

Once a function or service is outsourced there may be misunderstandings about the service or product to be provided. For example, a military installation that outsources its grass cutting functions assumes that this also includes edging. Whereas, the service provider views the contract as only covering grass cutting and shrub trimming.

When push comes to shove, many providers could leverage their position. This can be especially true when the Government outsources into a limited supply market. Although classic economic theory suggests that similar firms produce goods and services that are only differentiated by price [Ref. 10]. In reality this is not the case. For example, prior to the current outsource contract, the U. S. Navy was considered to be the only entity within the continental United States providing vertical replenishment operations at

thus limiting the number of firms providing this service. Moreover, of the 180 Invitations to Bid, only five companies competed for the HC mission [Ref. 11].

Suffering interruptions to supply or the event of surge capacity is serious other risk DOD assumes when outsourcing. If the supplier has internal problems, such as employee shortages or losing an asset such as a helicopter; it can have serious ramifications for the Navy performing its mission. Additionally, outsourcing contracts must consider surge capacity requirements. Increases in requirements for contingencies may be difficult to meet unless specifically addressed by outsourcing contract specifications, if DOD has reduced internal infrastructure due to outsourcing.

None the less, the Government's relationship with contractors is fundamentally different than that of the private sector. The private sector forms partner-like relationships that allow firms to build bridges to pursue common goals, such as profit [Ref. 12]. The Government, conversely, has its hands tied with legislative barriers and regulations when it comes to dealing with the private sector [Ref. 13].

4. Regulations and Policies

First and foremost, outsourcing any logistics activity deemed necessary to maintain DOD's logistics capability requires a waiver by the Secretary of Defense. Such legislation is provided in section 2464 of title 10 and states, "that DOD activities should maintain a logistics capability (personnel, equipment, and facilities) sufficient to ensure technical competence and resources necessary for an effective and timely response to a mobilization or other national defense emergency." [Ref. 14]

Second, Office of Management and Budget (OMB) Circular A-76 establishes the Federal policy regarding using commercial activities. With continued pressure to reduce costs, commanders increasingly use this program to determine how to best apply limited resources. A-76 studies are used to achieve the most cost effective and efficient method of operation. Current OMB policy objectives are to retain inherently governmental functions and rely on the commercial sector for those services that are available in the private sector. Inherently governmental functions are functions so intimately related to the public interest, they mandate performance by the Government. These type functions are not in competition with the private sector. Whereas a commercial activity is an activity that provides services obtainable from the private sector. Military and/or Federal civilian employees or contract personnel may be involved in performing commercial activities. [Ref. 15]

OMB Circular A-76 states that, "the Government shall not start or carry on any activity to provide a commercial product or service if the product or service can be procured more economically from a commercial source." [Ref. 16] OMB Circular A-76 establishes detailed criteria for cost comparisons in determining the lower cost alternative. The objective of the cost comparison is to "level the playing field" between government and the private sector when competing on producing a product or providing a service.

C. HELICOPTER COMBAT SUPPORT COMMUNITY

This section provides background information on the Helicopter Combat Support Community (HC). The HC community is the Navy's oldest helicopter community,

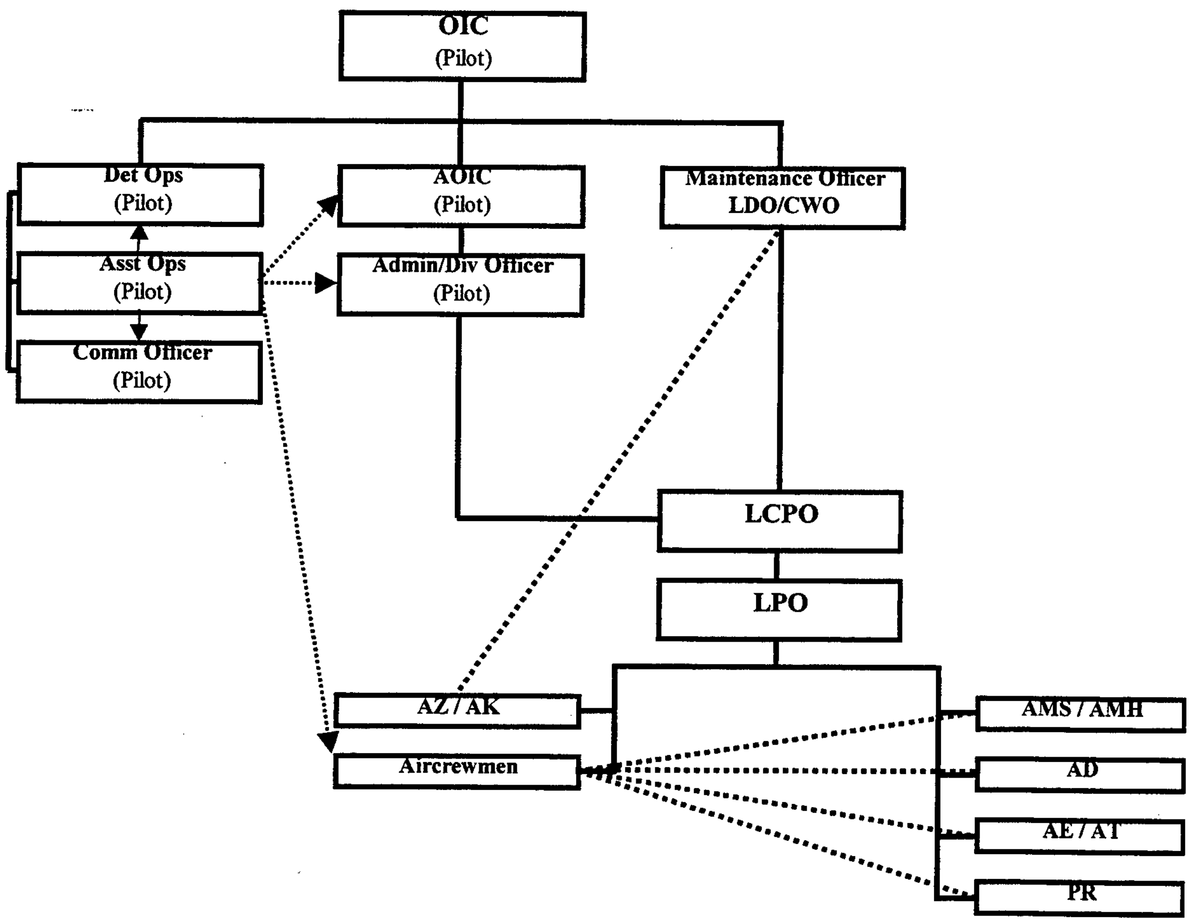
including seven squadrons that fly either the H-46 Sea Knight, the H-53 Sea Stallion, or the H-3 Sea King. Furthermore, HC-11 reigns as the Navy's largest helicopter squadron.

The Navy has long recognized the attributes of helicopters for logistics and combat support objectives. Today's HC community is critical to the US Navy's capability to deploy and remain on station for months at a time. HC squadrons and personnel currently carry out a melange of missions. The primary missions of the HC community include day/night Vertical Replenishment (VERTREP), Vertical Onboard Delivery (VOD), day/night amphibious Search and Rescue (SAR), and Passenger, Mail, and internal Cargo transport (PMC). Secondary missions include Special Warfare Support (SWS) and recovering torpedoes, drones, Unmanned Aerial Vehicles (UAVs), Unmanned Undersea Vehicles (UUVs), Noncombatant Evacuation Operations (NEO), aeromedical evacuations (MEDEVAC) and humanitarian assistance and disaster relief.

When not deployed, HC squadrons perform a variety of fleet support homeguard operations, including SAR, MEDEVAC operations, and training support to the Naval Special Warfare forces. Additionally, HC squadrons support local area commands with predeployment workups, ammunition uploads and downloads, and VIP and passenger transfer. Notwithstanding, each squadron must maintain ongoing flight training for pilots and aircrew. [Ref. 17]

Five of the seven HC squadrons currently fly the H-46 Sea Knight helicopter. Of those five, four are operational and the remainder (HC-3) is the fleet replacement squadron (FRS). Two of the four operational squadrons (HC-6, HC-8) are part of the Atlantic Fleet and the other two (HC-11, HC-5) belong to the Pacific Fleet. Typically, each of the four operational squadrons deploys on board ships in small sea-going

detachments consisting of six pilots, 22 enlisted members, one maintenance officer, and two H-46 Sea Knight helicopters. A typical HC detachment organizational makeup can be seen in Figure 2.3. Sea-going detachments deploy on L-class amphibious assault ships (LPH, LHA, LHD), and various multi-product logistic ships (AOE, AOR, T-AFS, and MCS). [Ref. 18]



OIC	Officer-in-Charge
AOIC	Assistant Officer-in-Charge
Admin/Div Officer	Administrative/Division Officer
Det Ops	Detachment Operations Officer
Asst Ops	Assistant Operations Officer
Comm Officer	Communications Officer
LDO/CWO	Limited Duty Officer/Chief Warrant Officer

LCPO	Leading Chief Petty Officer
LPO	Leading Petty Officer
AZ	Aviation Maintenance Administrationman
AK	Aviation Storekeeper
AMS	Aviation Structural Mechanic (Structures)
AMH	Aviation Structural Mechanic (Hydraulics)
AD	Aviation Machinist's Mate
AE	Aviation Electrician's Mate
AT	Aviation Electronics Technician
PR	Aircrew Survival Equipmentman

Figure 2.3 HC Detachment Organizational Chart

D. MILITARY SEALIFT COMMAND SHIPS

Military Sealift Command (MSC) ships are a large part of the Navy's Combat Logistics Force (CLF). According to the MSC website, MSC's mission "is to provide ocean transportation of equipment, fuel, supplies and ammunition to sustain U.S. forces worldwide during peacetime and in war for as long as operational requirements dictate." During war, more than 95 percent of all the equipment and supplies needed to sustain the U.S. military are carried by sea. Numerous international crises in the 1990s have underscored the Military Sealift Command's vital role as a major contributor in executing our national strategy. The command operates ships for U.S. Navy fleet support; provides special ocean missions support to U.S. government agencies; prepositions U.S. military supplies and equipment at sea; and provides ocean transportation for defense cargo in both peacetime and war. [Ref. 19]

The MSC's Naval Fleet Auxiliary Force is the lifeline to U.S. Navy ships at sea. These ships transfer fuel, ammunition, provisions, stores, spare parts, and personnel to underway-naval forces, enabling the Navy to operate at the highest operational tempo possible by allowing its ships to remain at sea for the maximum time possible. Currently,

possible by allowing its ships to remain at sea for the maximum time possible. Currently, MSC operates 27 of the Navy's CLF ships: 14 oilers (TAO), 7 ammunition ships (TAE), and 6 combat stores ships (TAFS). [Ref. 20] These ships are manned and operated by civilians and a small military department.

Also embarked is the HC squadron detachment. The military department is assigned to carry out specialized military functions, such as communications and supply operations. The HC squadron detachment primarily fulfills the helicopter logistics support mission by transporting vital supplies to various naval assets. Throughout the fleet, logistical support dominates helicopter operations. On average, an HC detachment aboard MSC ships moves roughly 112 passengers, 1051.1 tons of external cargo, and 23.5 tons of internal cargo and mail per month [Ref. 21].

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III. IN-HOUSE COST ANALYSIS

A. INTRODUCTION

This chapter presents the current total in-house cost to perform the Helicopter Combat Support mission aboard Military Sealift Command ships. First, the chapter calculates the Navy's cost for operating all the Helicopter Combat Support Squadrons that fly the H-46 Sea Knight helicopter. This will be done in accordance with OMB Circular A-76 guidelines. Furthermore, this study will establish the total cost of a typical HC squadron, and fracture that cost down to a quintessential deployed HC detachment.

Although the current Naval Helicopter Master Plan strategy is to replace the current inventory of H-46s with CH-60S, this study only evaluates the existing H-46 data. At present, there are no existing cost data concerning the CH-60S; measuring such data would be hypothetical in nature and outside the scope of this thesis. Since the current contract for outsourcing the HC mission aboard MSC ships only applies to those ships operating within the Sixth Fleet Area of Responsibility (AOR), and not the Navy as a whole, this study can only compare those costs that are similar. However, to compute an accurate cost of a typical HC squadron, costs from all squadrons were utilized and divided by the number of current aircraft series in the H-46 inventory. This provides a weighted average cost per aircraft. The primary reason for not differentiating between major claimants (Atlantic Fleet and Pacific Fleet) was to include costs associated with the FRS, which supplies all HC squadrons with qualified pilots and aircrew. A secondary reason for not differentiating claimants is because HC squadrons all vary in size and shape.

The cost data presented are divided into subsequent categories as outlined in OMB Circular A-76. Capital costs include all of the costs incurred from owning the asset. These include aircraft depreciation, the cost of capital and insurance cost. Operating expenses include all costs associated with operating the aircraft, except for military personnel expenses. The final costs include all organizational military personnel expenses, including wages and fringe benefits.

B. CAPITAL EXPENSES

1. Depreciation

Straight-line depreciation is the method outlined in OMB Circular A-76 in determining annual depreciation expenses. By definition, depreciation represents the cost of ownership and the consumption of an asset over its useful life. To determine the cost of depreciation, the residual value is subtracted from the total of the acquisition cost plus any capital improvements. Those results are then divided by the estimated useful life of the asset. [Ref. 22]

Although the H-46 Sea Knight helicopter is still in operation at the time of this thesis, the Navy will begin to gradually incorporate the CH-60S within the upcoming year. For the purposes of this analysis, the H-46 Sea Knight, an asset that has been in service for more than thirty years, shall be considered fully depreciated.

2. Cost of Capital

The cost of capital is an attributed charge on the government's investment in capital assets necessary for the activity to provide the product or service. The cost of

capital accounts for the Government's interest on the debt if the asset in question is purchased. According to OMB Circular A-76, the cost of capital will be computed by applying the nominal interest rate to the estimated total cost of the asset. [Ref. 23] Since the H-46 Sea Knight is more than thirty years old, the nominal interest rate is equal to the nominal interest rate paid on a thirty year Treasury Note, which is currently 6.3% [Ref. 24].

However, OMB Circular A-76 stipulates that the annual cost of capital will only be added to the depreciation expense if the asset is purchased within two years prior to the comparison study, or the asset is scheduled to be purchase within the performance period [Ref. 25]. Since, the Navy has not purchased a Sea Knight in over 25 years, and has no intention of doing so in the future, calculating the cost of capital is not required.

3. Insurance

Involvement of Government activities inherently assumes risk and potential costs from property and liability claims. Although the Government is self-insured, these risks are normally covered by insurance in any private sector cost estimate. To maintain an equitable footing between the Government and the private sector, OMB Circular A-76 dictates that the Government factor in insurance costs when doing a cost comparison study [Ref. 26].

According to the General Services Administration (GSA), determining the annual cost for insurance would best be accomplished by utilizing insurance rates from a comparable aircraft. Research identified Columbia Helicopters as the only company in the United States flying the Boeing Vertol MOD 107, the civilian equivalent to an H-46.

This turned out to be fruitless, since Columbia Helicopters was unwilling to relinquish the data on their insurance costs.

The next step was to contact the insurance industry itself. Agents could only speculate the cost and alleged a high premium due to their unfamiliarity with the type of aircraft and the extensive risk involved with external utility work. GSA agreed that the insurance costs were unreasonably high. As the last resort, the annual cost of insurance was calculated using information that GSA had provided in another study. The annual cost for insurance was calculated at 1.75% of replacement value for collision insurance, coupled with a liability calculation of $6000 plus $250 per seat in the aircraft [Ref. 27].

Figure 3.1 provides the per aircraft capital expenses for operating the H-46 Sea Knight.

Estimated H-46 Replacement Value	$ 8,000,000
Annual Depreciation Costs	$ 0
Annual Cost of Capital	$ 0
Collision Insurance	$ 140,000
Liability Insurance	$ 11,500
Total Annual Capital Expenses	**$ 151,500**

Figure 3.1 Capital Expenses

C. MILITARY PERSONNEL COSTS

Military personnel expenses are calculated using the Military Composite Standard Pay and Reimbursement Rates. The composite pay rates are developed in accordance

with the provisions set forth within DOD Financial Management Regulations and are used to charge for reimbursement for services provided, as well as in determining the cost of military personnel in management studies [Ref. 28]. The composite rates are derived by summing the following cost elements: basic pay, retired pay accrual, basic allowance for quarters, basic allowance for subsistence, incentive and special pay, permanent change of station, and miscellaneous expense. Appendix B breaks down the rates for FY 2000. [Ref. 29]

The distribution of HC personnel pay grades varies from squadron to squadron and from detachment to detachment. For this reason, an HC squadron weighted average is more representative of the actual pay grades available vice the Navy's standard cost multiplier for officer and enlisted personnel.

The approach for determining the personnel expenses for an HC squadron was based on the fact that the manning levels for personnel assigned to both sea and shore duty varied with the number of aircraft assigned to each squadron and thus differed among the HC squadrons. A review of each HC squadron's Activity Manning Document identified the manning structures by pay grade. The requirement numbers were based on requirement vice the authorized billets, since the requirement represents the best data available to meet the Navy's commitment to sustain two simultaneous Major Regional Conflicts (MRC). However, the total personnel cost associated with meeting the requirement will imply larger than actual personnel costs; the actual number of personnel on board is currently less than what is required.

The next step was to calculate the average number of personnel by pay grade, (see Appendix C). The result portrays the manning in a typical HC squadron. Finally, these

data were multiplied by the Military Standard Composite Rate to establish the overall military personnel expense for an HC squadron. The results are presented in Figure 3.2.

Military Pay Grade	Squadron Personnel	Annual DOD Composite Rate	Total
0-5	2	$ 115,450	$ 230,900
0-4	9	$ 98,775	$ 888,975
0-3	25	$ 86,050	$ 2,172,763
0-2	30	$ 66,925	$ 2,007,750
0-1	3	$ 53,175	$ 177,250
Warrant/LDO	6	$ 78,300	$ 430,650
E-9	2	$ 76,600	$ 153,200
E-8	2	$ 65,350	$ 147,038
E-7	13	$ 57,300	$ 716,250
E-6	45	$ 79,725	$ 3,607,556
E-5	97	$ 42,450	$ 4,107,038
E-4	60	$ 34,950	$ 2,097,000
E-3	78	$ 29,025	$ 2,263,950
Total	**372**		**$ 19,000,319**

Figure 3.2 HC Squadron Personnel Costs

D. OPERATING COSTS

Calculating the operating and support cost of any sophisticated military hardware can be a science within itself. Fortunately, the Naval Center for Cost Analysis (NCCA)

maintains the Navy's Visibility And Management of Operating and Support Cost (VAMOSC) program.

Historically, VAMOSC data were used predominantly by the Navy's cost analysts for developing the Operating and Support (O&S) cost portion of Life Cycle Cost (LCC) estimates for future systems. The VAMOSC database is an integral part of the Navy's efforts to better understand and control the Total Ownership Cost (TOC) of current and future weapon systems. Specifically, VAMOSC is used to develop the O&S portion of TOC baselines and identify consequential cost elements that might represent cost reduction opportunities. [Ref. 30]

Within the Navy VAMOSC database, cost data for aircraft are available for each fiscal year starting from 1984. These costs are obtained from fleet operating squadrons using existing reporting systems to identify those costs attributable to a particular type, model and series of aircraft. The cost data for the CH-46 Sea Knight contain 90 specific elements which are logically grouped into six mutually exclusive categories. These categories are defined in Figure 3.3 and a complete view of the VAMOSC data is presented in Appendix A.

NUMBER	CATEGORY	DEFINITION
1.0	Organizational Costs	Costs that are attributable to organizational level operations and maintenance support of regular operating aircraft.
2.0	Intermediate Costs	Costs attributable to intermediate level operations and maintenance support.

3.0	Depot Support Costs	Costs attributable to organic depot level maintenance activities and by commercial depot organizations.
4.0	Training Support Costs	Includes organizational costs of Fleet Readiness Squadrons, maintenance training, and specialty training.
5.0	Recurring Investment Costs	The cost of recurring investment items directly attributable to the various type, model and series.
6.0	Other Functions	Costs directly attributable to an aircraft type/model/series but not included elsewhere in the report. These include engineering or technical services support and costs of updating publications.

Figure 3.3 VAMOSC Cost Category Breakdown Structure [Ref. 31]

The operating cost to the Navy was calculated by normalizing all data to FY 2000 dollars utilizing DOD indices and summing the costs of the associated VAMOSC elements for the last five years of reportable data. The total was then divided by the number of H-46 Sea Knight helicopters by type, model, and series to determine the operating cost of an H-46 Sea Knight helicopter. A summary of the data in Appendix A is presented in Figure 3.4.

Dividing the total of each type/model/series by the quantity of associated aircraft provides a better estimate of the true cost than calculating through linear regression. The results from the linear regression proved to be statistically insignificant for each type helicopter. Within each analysis, the F value and the t value exceeded an alpha of .20

Category Cost Element	1994	1995	1996	1997	1998	Total
1.0 Organizational						
CH-46D	13,147.60	16,564.90	12,378.20	12,516.70	15,498.60	70,106.00
UH-46D	6,080.50	10,820.10	5,837.60	5,291.00	6,686.20	34,715.40
HH-46D	18,201.80	21,804.20	26,670.20	20,446.00	27,374.60	114,496.80
2.0 Intermediate						
CH-46D	4,563.90	4,271.30	4,193.00	4,357.30	5,411.20	22,796.70
UH-46D	2,015.40	1,729.40	1,890.20	1,897.80	2,917.50	10,450.30
HH-46D	6,507.50	5478.9	4,230.60	4,781.10	4,440.90	25,439.00
3.0 Depot						
CH-46D	4,731.80	5,558.40	9,274.60	8,746.40	6,543.70	34,854.90
UH-46D	2,641.80	2,809.50	3,878.60	1,514.70	993.7	11,838.30
HH-46D	6,823.30	8643.6	15,444.50	9,519.80	13,899.60	54,330.80
4.0 Training Support						
CH-46D	8,739.10	13,483.70	8,375.80	5,885.60	4,132.70	40,616.90
UH-46D	70.8	181.8	29.8	1,686.80	144.9	2,114.10
HH-46D	8,343.00	14551.2	15,292.40	9,448.60	11,656.00	59,291.20
5.0 Recurring Investment						
CH-46D	5,141.60	10,162.60	6,973.10	10,268.60	10,385.80	42,931.70
UH-46D	2,203.60	3,757.30	3,237.50	4,944.10	5,192.70	19,335.20
HH-46D	6,059.90	11271.7	10,210.50	15,212.60	16,377.40	59,132.10
6.0 Other Functions						
CH-46D	216.5	359.4	414.3	367.1	311	1668.3
UH-46D	188	143	187.9	172.7	151.5	843.1
HH-46D	309.20	348	509.1	480.7	432.8	2079.8
Total Type / Model / Series Cost					**CH-46**	**$ 212,974.50**
					UH-46	**$ 79,296.40**
					HH-46	**$ 314,769.70**
Total H-46 Quantity						
CH-46D	28	28	28	27	26	**137**
UH-46D	12	11	13	13	13	**62**
HH-46D	33	33	41	40	41	**188**
				Annual O&S per Aircraft		
					CH-46	**$ 1,554.56**
*Cost in FY00$K					**UH-46**	**$ 1,278.97**
					HH-46	**$ 1,674.31**

Figure 3.4 VAMOSC H-46 Cost Summary from Appendix A

indicating the relationship over a five-year period between cost, and the independent variables; quantity, flight time and time were not related at a given level of significance. Navy standards for cost estimation utilize .20 for alpha [Ref. 32]. The linear regression results are presented in Appendix E.

Originally, the data were categorized by Major Claimant, but were later combined to obtain a Fleet total. At first, the process was to only include costs associated with the Atlantic Fleet HC squadrons, since the current outsource contract with Geo-Seis Helicopters operates under the Atlantic Fleet's Area of Responsibility (AOR). However, the FRS operating cost falls under the Pacific Fleet's budget. A portion of this cost should be included. The FRS provides the initial training required for flying a Sea Knight helicopter, and then supplies the operational squadrons with qualified pilots and aircrewmen. Operational squadrons would have had to bear these training costs without the FRS. Although VAMOSC data do provide FRS costs, they do not allocate these costs across squadrons. Moreover, combining all the cost data available and dividing by the total number of aircraft type/model/series provides a better estimate of the true cost.

Additionally, the operating costs captured within the VAMOSC data contain personnel costs. However, except for FRS personnel, VAMOSC personnel costs are omitted for the purposes of this study. Instead, personnel costs were calculated as previously discussed, using the Standard Military Composite Rate. VAMOSC personnel costs were kept when evaluating FRS military personnel expenses. Although the FRS Activity Manning Document provides the number of personnel attached to the squadron, it does not account for the pilot and aircrew students that are trained there.

E. DETACHMENT COST

From the previously calculated data, the cost of a typical HC detachment can be derived. The process is synonymous to calculating the cost of an HC squadron. The scaled-down number calculations for capital expenses and operations are added to detachment military personnel expenses.

Military Pay Grade	Detachment Personnel	Annual DOD Composite Rate	Total
0-4	1	$ 98,775	$ 98,775
0-3	3	$ 86,050	$ 258,150
0-2	2	$ 66,925	$ 133,850
Warrant/LDO	1	$ 78,300	$ 78,300
E-7	1	$ 57,300	$ 57,300
E-6	3	$ 49,725	$ 132,600
E-5	8	$ 42,450	$ 353,750
E-4	5	$ 34,950	$ 163,100
E-3	6	$ 29,025	$ 164,475
Total	**29**		**$ 1,440,300**

Table 3.5 HC Squadron Detachment Personnel Cost

The method for determining the manning strength of a detachment involved averaging each Sea Knight squadrons' detachment make-up and incorporating the same calculations with regard to the Military Composite Standard Pay Rate. Justification for determining the average detachment make-up reflects minor differences in detachment personnel from squadron to squadron and from detachment to detachment. These differences are associated with personnel qualifications and personnel operational tempo.

For example, each detachment deploys with a Non-Destructive Inspection (NDI) technician. This detachment member can be an Aviation Structural Mechanic First, Second, or Third Class Petty Officer. Additionally, HC-11 detachment manning data were omitted because that squadron does not deploy detachments aboard MSC ships. Table 3.5 presents the detachment personnel manning strength and cost.

Next, the annual O&S cost of an H-46 Sea Knight helicopter is multiplied by the number of aircraft annually deployed aboard MSC ships. A study by the Center for Naval Analyses determined that current operational tempo for H-46 detachments represents 2-2.5 deployments among Atlantic Fleet MSC ships and approximately 2.8 deployments supported by Pacific Fleet MSC ships [Ref. 33]. Thus, six H-46s per fleet are required to meet MSC logistic requirement. This is consistent with the Navy's historical experience of two-aircraft detachments aboard MSC ships [Ref. 34].

The data were not readily available to determine the make-up of aircraft in each detachment. However, none of the HC squadrons deployed HH-46s board MSC ships. Thus, only CH-46s or UH-46s were available for deployment. For the purposes of this study, the calculations for HC detachment operational cost use CH-46 cost data. Thus, the total O&S costs could possibly be overstated, since the cost data indicates UH-46s are cheaper than CH-46s. Figure 3.6 summarizes the total in-house cost for the HC community, a typical HC squadron and a typical HC detachment cost and the annual cost to meet the operational tempo as previously discussed.

	O&S	Personnel Expenses	Capital Expenses	Total
HC Community	$ 607,040,600	$ 75,824,025	$ 12,120,000	$ 694,984,625
Squadron	$ 21,655,556	$ 19,000,319	$ 2,121,000	$ 42,776,875
Detachment	$ 3,109,116	$ 1,440,300	$ 303,000	$ 4,852,416

Figure 3.6 Annual Detachment In-House Cost

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IV. COMPARISON ANALYSIS

A. INTRODUCTION

The current outsourcing contract is a $20.3 million three-year fixed price contract with an additional $10.9 million two-year option [Ref. 35]. This chapter evaluates the outsourcing contract and compares the total in-house cost to that of the outsourcing contract. The comparison will not only look at a dollar for dollar evaluation, but will also reference the Most Efficient Organization in meeting the requirements established in the Performance Work Statement, when both the organization and the service provider are able to operate within the same limitations. Furthermore, the chapter will evaluate other implications of outsourcing the Helicopter Combat Support mission aboard MSC ships. These evolve around current shortages of helicopter pilots to fill first and second sea tour billets.

B. MOST EFFICIENT ORGANIZATION

The Most Efficient Organization (MEO) is the Government's means for choosing the most adept way of meeting the requirements set forth in the Performance Work Statement (PWS). The objective of the PWS is to define what is being requested, the performance standards and measures, and time required on which the cost analysis is based. The PWS should be performance-oriented, specifying what outputs or measures are desired and limiting directions as to how the results are achieved. [Ref. 36]

Prior to the current outsourcing contract, the Navy deemed the Helicopter Combat Support community as the Most Efficient Organization for carrying out the logistics function aboard MSC ships. The current strength of the HC community is based on

requirements for the Navy to support two Major Regional Conflicts (MRC). The primary authorized aircraft (PAA) to satisfy the two MRC requirement is 72, including the training helicopters required at the FRS. Of the 29 H-46s in the Atlantic Fleet, 12 are required to satisfy the MSC mission. In the Pacific Fleet, 16 of 43 H-46s are required to satisfy the MSC mission. [Ref. 37]

For an equitable comparison, determining the most efficient organization assumes the Navy and the service provider are configured similarly to meet the requirements established in the PWS. Then cost savings from outsourcing would be achieved through the contractor's ability to achieve efficiencies either from better skilled employees, more efficient aircraft, or more efficient suppliers. The current contractor provides two aircraft to meet Sixth Fleet operations. The contractor assumes responsibility for providing aircraft in the event maintenance requirements obstruct mission completion or a mishap takes place. Concerning the helicopter commercial contract at MSC, Mr. Achille Broennimann, identified the contractor's strategy of maintaining an additional aircraft within the AOR [Ref. 38]. While not supporting MSC missions, the third aircraft is available to the contractor for other profitable operations. The reduced number of assets maintained by the contractor assumes that any surge requirement involving unexpected contingencies will not be met.

Another difference between the contractor and the Navy is the SAR swimmer capability. Embarked aboard every deployed H-46 aircraft is a "wet crewman" capable of swimmer assisted personnel rescues. The Statement of Work (SOW) provision within the contract considers SAR a primary mission. However, the service provider must only provide visual search and rescue operations with non-swimmer assisted personnel

recovery [Ref. 38]. The SAR swimmer capability is practiced by Navy SAR crews with the qualifications and currency requirements governed by Navy standardization policies. Additionally, each "wet crewman" receives Special Duty Assignment Pay as a rescue swimmer [Ref. 39]. Special Duty Assignment Pay was accounted for when calculating military personnel expense using the Navy Military Composite Rate. For a service provider, these are considered specialized services; it would be costly to train and demonstrate proficiency associated with meeting the requirements.

During the period from October 1995 through November 1998, HC-6 detachments aboard MSC ships averaged 72.9 flight hours per month, of which 44.8 hours were operational and the remaining 28.1 flight hours were applied for training [Ref. 40]. The commercial helicopter liaison officer with MSC, pointed out that current operations have fallen to approximately 25 flight hours per month, of which 4 flight hours have been devoted to training [Ref. 41]. This study does not attempt to explain why there has been a 66% drop in operational hours, but instead points out the difference in the way the service provider operates compared to the Navy. With this noted, Navy detachments expend 38.5% of their flight time maintaining pilot proficiency whereas the commercial contractor devotes 16% of its flight time for training. The disparity in flight time devoted for training allows the contractor to reduce operational costs.

Finally, the SOW limits the detachment to no more than 15 personnel [Ref. 42]. Currently, the contractor is operating with four pilots and three maintainers. This crew size is far less than an HC detachment as described in Chapter II. The reason for this is twofold. First, the contractor's type aircraft is not as old as the H-46, and presumably requires less maintenance. Second, the number of passenger seats in the contractor's

aircraft is less than half of an H-46. While the contractor's aircraft is limited to eight passengers, the H-46 Sea Knight can transport up to 20 passengers [Ref. 43]. Federal Aviation Regulations (FAR) requires additional maintenance if a helicopter or rotorcraft exceeds a passenger seat capacity of ten [Ref.44]. The SOW only requires the helicopter to have the ability to move five passengers [Ref. 45].

C. OPS TEMPO

Successful savings from outsourcing the HC mission aboard MSC ships can only be defined when equal services are provided. Unfortunately, there are differences in the Navy's capability versus that of the contractor. This becomes a question of trade-offs, and at some point the issue of sacrificing capability to reduce costs becomes a critical topic to address. As analyzed in the previous chapter, 2 to 2.5 deployments are performed among Atlantic Fleet MSC ships and the Pacific Fleet MSC ships make approximately 2.8 deployments annually. Typically, peacetime deployment cycles averaged six months in duration. To fulfill the 2 to 2.5 requirement in the Atlantic Fleet, the HC community would have to maintain three detachments, totaling six aircraft. One detachment would deploy for six months and would be relieved by a second detachment. The third HC detachment would be to fulfill the other .5 deployment if required.

According to the SOW, within the current outsource contract operating in the Atlantic Fleet, the service provider's required service schedule is to deploy one detachment for 12 months. [Ref. 46] This presumes a .5 deployment difference between what the contractor furnishes versus what the Navy provides. Assuming equivalent

services, current Navy practices of deploying detachments for six months would require the Navy to provide two detachments totaling four aircraft.

According to the SOW, the service provider is allowed to keep the detachment in theater and cross-deck to relieving vessels. The contractor can, but is not required to, rotate personnel. [Ref. 47] By limiting movement of such assets the contractor reduces operational costs. The Navy, on the other hand, could maintain H-46 aircraft in theater but does not exercise this option. Furthermore, the Navy would rotate personnel since perstempo is a major factor in moral and retention and is closely monitored by the CNO.

A comparable cost analysis is presented in Figure 4.1. The table illustrates the cost savings obtained when comparing the current outsource contract with an associated number of detachments.

Dets	Aircraft	In-House Cost	Contract Costs	Contract Savings
3	6	$ 14,557,248	$ 6,766,667	$ 7,790,581
2	4	$ 9,704,832	$ 6,766,667	$ 2,938,165
Rotating Personnel and Maintaining 3 H-46s in Theater				
2	3	$ 7,847,274	$ 6,766,667	$ 1,080,607

All costs in FY00$M

Figure 4.1 Outsourcing Comparison Savings

The corresponding number of detachments reflects the Navy's current way of meeting the requirement with 3 detachments for an op tempo of 2 to 2.5 deployments per annum. If the outsourcing contract is based upon the Navy's practice of three detachments to meet the 2 to 2.5 op tempo requirement, a 53.52% savings is achieved. The table also compares two detachments with the outsource contract. This comparison reflects the op tempo the contractor currently provides with the Navy's practice of two detachments deploying for six-months. If the Navy assumes that only two detachments will fulfill the op tempo requirement then a 30.28% savings is achieved. Finally, the table compares the Navy's costs when conducting operations in a manner similar to that of the contractor: maintaining assets in theater and rotating personnel. If the Navy changes its business practice to match the contractor's most efficient operation by cross-decking aircraft and rotating personnel, the savings dwindles further to only a 13.77%.

D. PERSONNEL SHORTFALLS

1. Other HC Squadron Commitments

During routine peacetime operations, an HC squadron will have one detachment either deployed for six months aboard a MSC ship or performing home guard operations. The percentage of the cost devoted to the MSC mission is minimal compared to the overall cost of fulfilling all the missions of an associated HC squadron. Figure 4.2 depicts the annual cost relationship for one H-46 detachment as compared to an HC squadron.

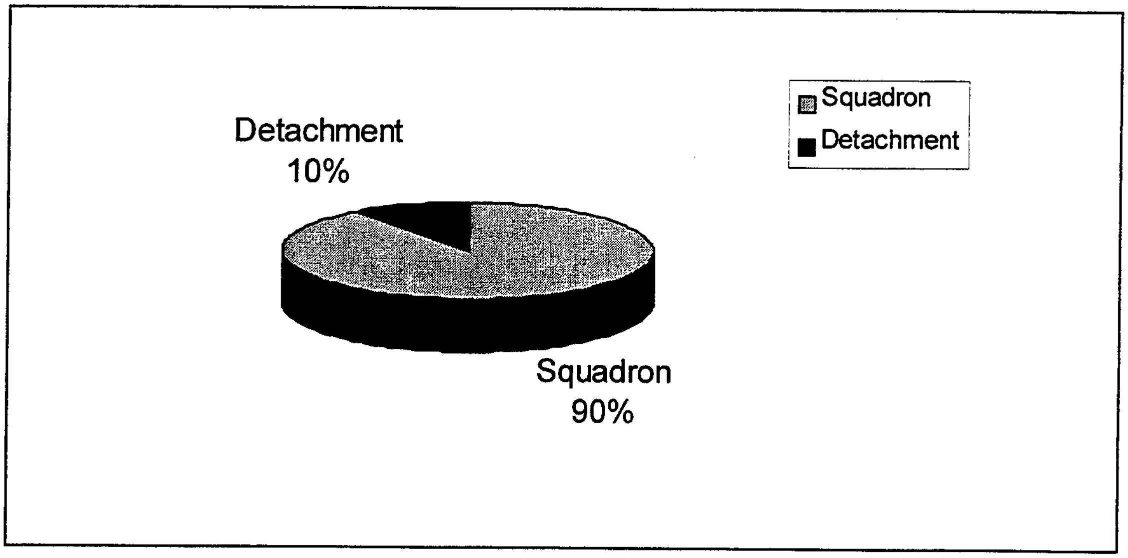

Figure 4.2 Percentage of Squadron Expense Devoted to a Detachment

Outsourcing the HC mission to a commercial provider may not alleviate any costs because that the infrastructure required to maintain the current Naval requirements for Helicopter Combat Support operations is still in place. Furthermore, if the Navy were to remove some of the assets (A/C, personnel) this could increase the non-quantifiable costs of maintaining those squadrons in other areas. For example, the pilots and aircrewmen that perform Logistic Support missions aboard MSC ships are also trained and available to perform these missions aboard other CLF and amphibious ships. Such flexibility insures that HC squadrons maintain the capability to deal with unsuspected contingencies. Additionally, these same personnel are utilized for other various support jobs within the squadron when not deployed. Examples range from, but are not limited to, schedules officer, first lieutenant, safety officer and legal officer.

Furthermore, each HC squadron has various collateral duties that differ from other squadrons. HC-3 is the Pacific Fleet SAR coordinator, and coordinator for the Helicopter

Control Officer (HCO) and Landing Signalmen Enlisted (LSE) schools. HC-5 provides the only permanently assigned air asset in Guam and the Mariana Islands that perform crucial SAR and MEDIVAC operations within that region. HC-8 maintains and operates the Atlantic Fleet Helicopter Operations School, which provides HCO, LSE, Helicopter Instrument Ground School (HIGS) and Night Vision Goggle Training (NVGT) for the Atlantic Fleet.

2. 2nd Sea Tour Requirements

Outsourcing further retards the Navy's ability to meet 2nd sea tour pilot requirements. Currently, HC pilots man 39% of pilot sea billets aboard CV/CVN and Amphibious ships. This exceeds all other helicopter communities. HSL provides 35%, HS 19%, HM 3%, and the 1300 designator make up the remaining 4%. In order to fill these billets, the Navy requires 125 personnel. [Ref. 48] As it stands, there is a helicopter pilot shortage to meet the 2nd sea tour requirement.

Previous discussions developed the fundamental of reducing costs and creating efficiencies through outsourcing. By outsourcing the HC mission aboard MSC ships, pilot, aircrewmen and aircraft O&S costs would be reduced by eliminating such assets. However, reducing pilot squadron manning levels effects the future of other asset manning levels. Consequently, outsourcing the HC mission aboard MSC ships will impede the Navy's ability to meet other requirements. Because of this, any efficiency gained through outsourcing may be diminished. Figure 4.3 identifies the projected shortage of pilots required to meet the 2nd sea tour billets.

Year Group	Beginning Number of Pilots	Current Number of Pilots	Historical 40% Retention	125 2nd Sea Tour Billets	Short Fall
1985	275	114	110	N/A	
1986	361	125	144	N/A	
1987	312	113	125	N/A	
1988	294	119	118	N/A	
1989	290	151	116	N/A	
1990	300	181	120	125	-5
1991	238	194	95	125	-30
1992	252	245	101	125	-24
1993	196	190	78	125	-47
1994	124	122	50	125	-75
1995	165	165	66	125	-59
1996	200	200	80	125	-45
1997	229	229	92	125	-33

Figure 4.3 Helicopter Pilot 2nd Sea Tour Shortfall [Ref. 49]

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V. SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

A. SUMMARY

Chapter II defined outsourcing and described its advantages and disadvantages. Noteworthy is the ability of outsourcing to reduce cost and increase efficiencies. Just as credible is the Navy's risk to surge capacity and supplier leverage by the limited number of firms within the helicopter industry capable or willing to perform the logistics mission aboard MSC ships. Chapter II also illustrated the capabilities and characteristics of the HC community and described the services each squadron provides. Moreover, the chapter painted a picture of what a typical HC detachment looks like through an organizational chart. The chapter concluded by describing the attributes and role of the Military Sealift Command within the national security of the United States.

Chapter III calculated the in-house cost of the five squadrons (HC-3, HC-5, HC-6, HC-8, HC-11) flying the H-64 Sea Knight helicopter. The in-house costs included capital expenses, military personnel costs and operating costs. Furthermore, the chapter fractured these costs down to that of a typical squadron and a typical detachment. The computations resulted in the total in-house cost equal to $694,984,625 for the HC community, $42,776,875 for a typical squadron and the annual cost per detachment calculated at $4,852,416.

Chapter IV compared the calculations performed in Chapter III with the current outsource contract. By examining the statement of work within the contract, the differences were analyzed and compared. Some of these differences, such as the exclusion of a SAR swimmer and the reduced passenger seats in the outsource contract, were unquantifiable. However, the chapter analyzed the attributes between the outsource

contract and the HC community by equating services. Once the costs were compared on equal footing using the most efficient Navy organization, it was determined that the Navy would generate a savings of 13.77% through outsourcing.

B. CONCLUSIONS

Although the savings through outsourcing the HC mission aboard MSC ships in the Atlantic Fleet appears promising, it is far less than the 30% the Navy hopes to achieve through most outsourcing initiatives. Furthermore, the Navy could be susceptible to risk in the event contingencies arise with limited logistics support or having to utilizing other helicopter assets to meet surge requirements. This risk may transcend even further if the Navy continues outsourcing and eliminates infrastructure to further reduce costs. Considering the percentage of commercial activities capable or willing to participate within the outsourcing initiative (roughly 3% of the industry), if the Navy reduces its assets, it may be susceptible to contract escalation rates that are higher than historic in-house escalation rates. If the Navy does reduce pilot/aircrew and aircraft infrastructure and contract costs escalate higher than historic in-house rates, then the Navy would be stuck with the added costs of not just the higher contract rates, but also the costs in time and money to rebuild its infrastructure.

As noted, the savings through outsourcing are not as large when the commercial activity and the HC community operate in the same manner. In fact the savings are even less when one attempts to quantify the additional assets the Navy provides, such as SAR swimmer and the capability to transport more than 8 passengers at a time. An additional consideration involves the costs to the HC community in loosing valuable at sea training

flights that maintain pilot and aircrew proficiency for missions other than the MSC logistics support.

Any savings achieved from outsourcing are further scaled down when it comes to meeting other personnel requirements. Although a detachment equates to approximately 10% of the squadrons overall costs, these personnel and aircraft give the squadron and the Navy greater flexibility in achieving other scheduled and unscheduled commitments. Current squadron manning levels reflect not only pilot requirements, but also those jobs that need to be accomplished by Naval officers. Reducing the squadron manning levels reduces the flexibility aspect as previously mentioned and strains the squadrons ability to fulfill non-flying squadron requirements. Additionally, reduced pilot manning levels are already straining the Navy's ability to fill pilot 2nd sea tour billets. Any additional reductions through outsourcing will further impede the Navy's ability to fill these billets. Though not quantifiable in nature, such personnel reductions are costs with which the Navy will have to contend.

C. RECOMMENDATIONS

Instead of outsourcing, the Navy has the opportunity to change its business practices. Similar to the service provider, the Navy should evaluate keeping helicopter assets in theater and rotating personnel. From Figure 4.1, this would reduce the Navy's in-house costs in the Atlantic Fleet by 46%. This is a particularly viable in the Atlantic Fleet since the infrastructure is partially in place at NAS Rota, Spain or NAS Sigonella, Italy. One area for study is converting HC-4 in NAS Sigonella into a composite squadron

flying H-46 and H-53 helicopters. Furthermore, the Navy and MSC could possibly have greater savings by keeping the MSC ships forward deployed out of Augusta Bay Italy.

With an aging aircraft such as the H-46, outsourcing the MSC logistics mission is a viable solution until the Navy is able to replace the current inventory with the CH-60S. In theory, the new aircraft O&S costs should be significantly less than the older H-46 Sea Knights. Once the HC community is flying the CH-60S, another cost comparison analysis should be conducted to determine if outsourcing is still a viable solution. However one should consider if outsourcing effects the size of the CH-60S procurement. Presumably if the primary authorized aircraft remains the same, then capital expenses should not be included since no procurement is associated with the MSC mission and only O&S costs would be relevant.

Last, if outsourcing is the future for the Navy, the Navy should determine the annual loss in personnel strength and conduct an analysis on how this would affect other Navy requirements.

APPENDIX A. NAVY VAMOSC DATA FOR H-46 AIRCRAFT

This appendix presents the VAMOSC data that were used for calculating the in-house O&S costs presented in Chapter III. Included in the appendix is the VAMOSC data for CH-46, UH-46, and the HH-46 helicopters from the period FY1994 through FY1998. The data include the breakdown of each mutually exclusive category. The last section of the appendix is a table of key processing considerations/limitations concerning VAMOSC data.

FY94-98 CH-46D Data, Costs in $K, Escalated to FY00 Dollars

CH-46D Element #	Element Description	1994	1995	1996	1997	1998
1.0	Subtotal Organizational Costs	24,223.50	40,334.40	37,246.00	37,381.00	39,398.70
1.1	Subtotal Organizational Personnel Costs	11,075.90	23,769.50	24,867.80	24,864.30	23,900.10
1.1.1	Military Personnel Costs	11,075.90	23,769.50	24,867.80	24,864.30	23,900.10
1.1.2	Civilian Personnel Costs	0	0	0	0	0
1.1.3	Contractor Personnel Costs	0	0	0	0	0
1.2	Subtotal Organizational Operations Costs	13,147.60	16,564.90	12,378.20	12,516.70	15,498.60
1.2.1	Temporary Additional Duty Costs	71.7	82.4	94	136.4	0
1.2.2	Training Expendable Stores Costs	0	0	0	0	0
1.2.3	Support Supplies Costs	4,020.80	4,040.80	3,315.40	3,871.20	4,406.90
1.2.3.1	Contract Logistics Support Costs	0	0	0	0	0
1.2.3.2	Other Costs	0	0	0	0	0
1.2.4	AVDLR Costs	7,877.50	11,377.10	7,960.80	7,458.40	10,166.50
1.2.4.1	Organic AVDLR Costs	7,877.50	11,377.10	0	0	0
1.2.4.2	Commercial RoR Costs	0	0	0	0	0
1.2.5	Fuel Costs	1,177.60	1,064.60	1,008.00	1,050.70	925.2
2.0	Subtotal Intermediate Costs	4,563.90	4,271.30	4,193.00	4,357.30	5,411.20
2.1	Subtotal Intermediate Personnel Costs	4,563.90	4,271.30	4,193.00	4,357.30	5,411.20
2.1.1	Military Personnel Costs	4,504.10	4,203.90	4,116.40	4,281.20	5,329.40
2.1.2	Civilian Personnel Costs	51.4	63.1	72.1	71.2	77.6
2.1.3	Contractor Personnel Costs	8.4	4.3	4.5	4.9	4.2
3.0 (87-91)	Subtotal Depot Support Costs FY87-91	0	0	0	0	0
3.0 (92->)	Subtotal Depot Support Costs FY92->	4,731.80	5,558.40	9,274.60	8,746.40	6,543.70
3.1 (87-91)	Subtotal Aircraft Rework Costs FY87-91	0	0	0	0	0
3.1 (92->)	Subtotal Aircraft Rework Costs FY92->	1,864.50	2,692.20	4,921.20	6,301.80	4,171.40
3.1.1 (87-91)	Aircraft Rework Intra-DOD Costs	0	0	0	0	0
3.1.1 (92->)	Organic Aircraft Rework Costs FY92->	1,864.50	2,692.20	4,921.20	6,301.80	4,171.40
3.1.1.1	Organic Aircraft Rework Units	3	4	22	76	5
3.1.2 (87-91)	Aircraft Rework Commercial Costs	0	0	0	0	0
3.1.2 (92->)	Commercial Aircraft Rework Costs FY92->	0	0	0	0	0
3.1.2.1	Commercial Aircraft Rework Units	0	0	0	0	0
3.1.3	DMISA Aircraft Rework Costs FY92->	0	0	0	0	0
3.1.3.1	DMISA Aircraft Rework Units	0	0	0	0	0

3.2 (87-91)	Subtotal Engine Rework Costs FY87-91	0	0	0	0	0
3.2 (92->)	Total Aircraft Rework Units	3	4	22	76	5
3.2.1	Engine Rework Intra-DOD Costs	0	0	0	0	0
3.2.2	Engine Rework Commercial Costs	0	0	0	0	0
3.3 (87-91)	Subtotal Component Rework Costs FY87-91	0	0	0	0	0
3.3 (92->)	Subtotal Engine Rework Costs FY92->	908	892.6	1,406.50	301.1	607.9
3.3.1 (87-91)	Component Rework-DOD Costs	0	0	0	0	0
3.3.1 (92->)	Organic Engine Rework Costs FY92->	908	892.6	1,406.50	0	607.9
3.3.1.1	Organic Engine Rework Units	18.5	13.2	25.7	5.1	6.7
3.3.2 (87-91)	Component Rework-Commercial Costs	0	0	0	0	0
3.3.2 (92->)	Commercial Engine Rework Costs FY92->	0	0	0	0	0
3.3.2.1	Commercial Engine Rework Units	0	0	0	0	0
3.3.3	DMISA Engine Rework Costs FY92->	0	0	0	0	0
3.3.3.1	DMISA Engine Rework Units	0	0	0	0	0
3.4 (87-91)	Subtotal Other Rework Costs 87-91	0	0	0	0	0
3.4 (92->)	Total Engine Rework Units FY92->	18.5	13.2	25.7	5.1	6.7
3.4.1 (87-91)	Other Rework - Miscellaneous Depot Costs	0	0	0	0	0
3.4.2 (87-91)	Other Rework - Engine Support Costs	0	0	0	0	0
3.5	Aircraft Support Services Costs FY92->	1,501.20	1,232.20	2,577.00	1,737.40	1,212.80
3.5.1	Program Related Logistics Costs	0	0	0	0.0	0
3.5.2	Program Related Engineering Costs	0	0	0	0.0	0
3.6	Subtotal Aircraft Emergency Repair Costs FY92->	456.8	638.6	367	397.4	550.8
3.6.1	Organic Aircraft Emergency Repair Costs FY92->	409	582	326.9	365.2	0
3.6.2	Commercial Aircraft Emergency Repair Costs FY92->	46.7	46.2	20	23.4	550.8
3.6.3	DMISA Aircraft Emergency Repair Costs FY92->	1.1	10.4	20.1	8.8	0
3.7	Subtotal Engine Emergency Repair Costs FY92->	1.3	2	2.9	8.7	0.8
3.7.1	Organic Engine Emergency Repair Costs FY92->	0.2	0.2	1	2.4	0
3.7.2	Commercial Engine Emergency Repair Costs FY92->	0	0	0	0	0.8
3.7.3	DMISA Engine Emergency Repair Costs FY92->	1.1	1.8	1.9	6.3	0
3.8	Support Equipment Maintenance	0	100.8	0	0	0
4.0	Subtotal Training Support Costs	8,739.10	13,483.70	8,375.80	5,885.60	4,132.70
4.1	Subtotal Fleet Readiness Squadron (FRS) Costs	8,463.00	12,460.20	8,291.90	3,983.40	3,687.30
4.1.1	Subtotal FRS Personnel Costs	4,589.90	4,434.40	2,230.80	0	1,328.00
4.1.1.1	FRS Military Personnel Costs	4,589.90	4,434.40	2,230.80	0	1,328.00
4.1.1.2	FRS Civilian Personnel Costs	0	0	0	0	0

4.1.1.3	FRS Contractor Personnel Costs	0	0	0	0	0
4.1.2	Subtotal FRS Operations Costs	3,873.10	8,025.80	6,061.10	3,983.40	2,359.30
4.1.2.1	FRS Temporary Additional Duty Costs	18.7	47.2	34.9	47.1	0
4.1.2.2	FRS Training Expendable Stores Costs	0	0	0	0	0
4.1.2.3	FRS Support Supplies Costs	1,705.20	2,240.60	1,590.00	1,196.70	822.5
4.1.2.4	FRS AVDLR Costs	1,790.50	5,298.80	4,038.80	2,439.80	1,419.20
4.1.2.4.1	FRS Organic AVDLR Costs	1,790.50	5,298.80	0	0	0
4.1.2.4.2	FRS Commercial RoR Costs	0	0	0	0	0
4.1.2.5	FRS Fuel Costs	358.7	439.2	397.4	299.8	117.7
4.2	Subtotal Operational/Maintenance Training Costs	276.1	1,023.50	83.9	1,902.20	445.4
4.2.1	Operational Training Costs	0	309.1	16.7	48.1	142.8
4.2.2	Maintenance Training Costs	276.1	714.4	67.2	1,854.10	302.6
5.0 (87-91)	Subtotal Recurring Investment Costs FY87-91	0	0	0	0	0
5.0 (92->)	Subtotal Recurring Investment Costs FY92->	5,141.60	10,162.60	6,973.10	10,268.60	10,385.80
5.1 (87-91)	Replacement Repair Costs FY87-91	0	0	0	0	0
5.1 (92->)	Subtotal Modifications Costs FY92->	5,141.60	10,162.60	6,973.10	10,268.60	10,385.80
5.1.1	Modification Kit Costs FY92->	5,012.80	9,779.60	5,725.50	7,469.30	7,771.60
5.1.2	Modification Spares Costs FY92->	128.8	383	1,247.50	2,799.30	2,614.00
5.1.3	Modification Installation Costs FY92->	426.9	167.4	572.5	251.1	676.2
5.2 (87-91)	Modifications Costs FY87-91	0	0	0	0	0
6.0	Subtotal Other Functions Costs	216.5	359.4	414.3	367.1	311
6.1	Navy Engineering and Technical Services (NETS) Costs	120.7	186.8	200.4	179.5	153.2
6.2	Contractor Engineering and Technical Services (CETS) Costs	88.9	84	120.8	128.2	108
6.3	Publications Costs	6.9	88.6	93.1	59.4	49.8
A.1	Total Aircraft Number	28	28	28	27	26
A.1.1	Regular Aircraft Number	21	21	21	21	22
A.1.2	FRS Aircraft Number	7	7	7	6	4
A.2	Total Flying Hours	12,217.00	12,680.00	11,798.00	10,952.00	8,449.00
A.2.1	Regular Flying Hours	9,106.60	8,830.40	8,122.10	8,432.80	7,481.00
A.2.2	FRS Flying Hours	3,110.40	3,849.60	3,675.90	2,519.20	968

FY94-98 UH-46D Data, Costs in $K, Escalated to FY00 Dollars

UH-46D

Element #	Element Description	1994	1995	1996	1997	1998
1.0	Subtotal Organizational Costs	11,278.10	23,562.80	21,216.50	21,494.70	21,233.90
1.1	Subtotal Organizational Personnel Costs	5,197.60	12,742.70	15,378.90	16,203.70	14,547.70
1.1.1	Military Personnel Costs	5,197.60	12,742.70	15,378.90	16,203.70	14,547.70
1.1.2	Civilian Personnel Costs	0	0	0	0	0
1.1.3	Contractor Personnel Costs	0	0	0	0	0
1.2	Subtotal Organizational Operations Costs	6,080.50	10,820.10	5,837.60	5,291.00	6,686.10
1.2.1	Temporary Additional Duty Costs	38.2	60.2	72.6	133.1	0
1.2.2	Training Expendable Stores Costs	0	0	0	0	0
1.2.3	Support Supplies Costs	1,729.20	2,657.90	1,385.00	1,328.80	1,229.70
1.2.3.1	Contract Logistics Support Costs	0	0	0	0	0
1.2.3.2	Other Costs	0	0	0	0	0
1.2.4	AVDLR Costs	3,488.60	7,431.30	3,652.60	3,082.20	4,880.80
1.2.4.1	Organic AVDLR Costs	3,488.60	7,431.30	0	0	0
1.2.4.2	Commercial RoR Costs	0	0	0	0	0
1.2.5	Fuel Costs	824.5	670.7	727.4	746.9	575.6
2.0	Subtotal Intermediate Costs	2,015.40	1,729.40	1,890.20	1,897.80	2,917.50
2.1	Subtotal Intermediate Personnel Costs	2,015.40	1,729.40	1,890.20	1,897.80	2,917.50
2.1.1	Military Personnel Costs	1,992.20	1,702.90	1,860.80	1,885.10	2,890.20
2.1.2	Civilian Personnel Costs	19.8	24.9	27.7	11.9	25.9
2.1.3	Contractor Personnel Costs	3.4	1.6	1.7	0.8	1.4
3.0 (87-91)	Subtotal Depot Support Costs FY87-91	0	0	0	0	0
3.0 (92->)	Subtotal Depot Support Costs FY92->	2,641.80	2,809.50	3,878.60	1,514.70	993.7
3.1 (87-91)	Subtotal Aircraft Rework Costs FY87-91	0	0	0	0	0
3.1 (92->)	Subtotal Aircraft Rework Costs FY92->	1,413.40	1,683.90	1,857.90	337.7	0
3.1.1 (87-91)	Aircraft Rework Intra-DOD Costs	0	0	0	0	0
3.1.1 (92->)	Organic Aircraft Rework Costs FY92->	1,413.40	1,683.90	1,857.90	337.7	0
3.1.1.1	Organic Aircraft Rework Units	2	2	3	13	0
3.1.2 (87-91)	Aircraft Rework Commercial Costs	0	0	0	0	0
3.1.2 (92->)	Commercial Aircraft Rework Costs FY92->	0	0	0	0	0
3.1.2.1	Commercial Aircraft Rework Units	0	0	0	0	0
3.1.3	DMISA Aircraft Rework Costs FY92->	0	0	0	0	0
3.1.3.1	DMISA Aircraft Rework Units	0	0	0	0	0

3.2 (87-91)	Subtotal Engine Rework Costs FY87-91	0	0	0	0	0
3.2 (92->)	Total Aircraft Rework Units	2	2	3	13	0
3.2.1	Engine Rework Intra-DOD Costs	0	0	0	0	0
3.2.2	Engine Rework Commercial Costs	0	0	0	0	0
3.3 (87-91)	Subtotal Component Rework Costs FY87-91	0	0	0	0	0
3.3 (92->)	Subtotal Engine Rework Costs FY92->	388.8	350.7	652.6	145	304
3.3.1 (87-91)	Component Rework-DOD Costs	0	0	0	0	0
3.3.1 (92->)	Organic Engine Rework Costs FY92->	388.8	350.7	652.6	145	304
3.3.1.1	Organic Engine Rework Units	8	5.2	11.9	2.4	3.3
3.3.2 (87-91)	Component Rework-Commercial Costs	0	0	0	0	0
3.3.2 (92->)	Commercial Engine Rework Costs FY92->	0	0	0	0	0
3.3.2.1	Commercial Engine Rework Units	0	0	0	0	0
3.3.3	DMISA Engine Rework Costs FY92->	0	0	0	0	0
3.3.3.1	DMISA Engine Rework Units	0	0	0	0	0
3.4 (87-91)	Subtotal Other Rework Costs 87-91	0	0	0	0	0
3.4 (92->)	Total Engine Rework Units FY92->	8	5.2	11.9	2.4	3.3
3.4.1 (87-91)	Other Rework - Miscellaneous Depot Costs	0	0	0	0	0
3.4.2 (87-91)	Other Rework - Engine Support Costs	0	0	0	0	0
3.5	Aircraft Support Services Costs FY92->	643.4	483.9	1,196.50	836.4	606.5
3.5.1	Program Related Logistics Costs	0	0	0	0	0
3.5.2	Program Related Engineering Costs	0	0	0	0	0
3.6	Subtotal Aircraft Emergency Repair Costs FY92->	195.8	250.7	170.4	191.5	82.9
3.6.1	Organic Aircraft Emergency Repair Costs FY92->	175.4	228.6	151.8	175.9	0
3.6.2	Commercial Aircraft Emergency Repair Costs FY92->	20	18	9.3	11.3	82.9
3.6.3	DMISA Aircraft Emergency Repair Costs FY92->	0.4	4.1	9.3	4.3	0
3.7	Subtotal Engine Emergency Repair Costs FY92->	0.4	0.6	1.2	4.1	0.4
3.7.1	Organic Engine Emergency Repair Costs FY92->	0	0	0.4	1.1	0
3.7.2	Commercial Engine Emergency Repair Costs FY92->	0	0	0	0	0.4
3.7.3	DMISA Engine Emergency Repair Costs FY92->	0.4	0.6	0.8	3	0
3.8	Support Equipment Maintenance	0	39.7	0	0	0
4.0	Subtotal Training Support Costs	70.8	181.8	29.8	1,686.80	144.9
4.1	Subtotal Fleet Readiness Squadron (FRS) Costs	0	0	0	0	0
4.1.1	Subtotal FRS Personnel Costs	0	0	0	0	0
4.1.1.1	FRS Military Personnel Costs	0	0	0	0	0
4.1.1.2	FRS Civilian Personnel Costs	0	0	0	0	0

4.1.1.3	FRS Contractor Personnel Costs	0	0	0	0	0
4.1.2	Subtotal FRS Operations Costs	0	0	0	0	0
4.1.2.1	FRS Temporary Additional Duty Costs	0	0	0	0	0
4.1.2.2	FRS Training Expendable Stores Costs	0	0	0	0	0
4.1.2.3	FRS Support Supplies Costs	0	0	0	0	0
4.1.2.4	FRS AVDLR Costs	0	0	0	0	0
4.1.2.4.1	FRS Organic AVDLR Costs	0	0	0	0	0
4.1.2.4.2	FRS Commercial RoR Costs	0	0	0	0	0
4.1.2.5	FRS Fuel Costs	0	0	0	0	0
4.2	Subtotal Operational/Maintenance Training Costs	70.8	181.8	29.8	1,686.80	144.9
4.2.1	Operational Training Costs	0	0	7.8	0	0.5
4.2.2	Maintenance Training Costs	70.8	181.8	22	1,686.80	144.4
5.0 (87-91)	Subtotal Recurring Investment Costs FY87-91	0	0	0	0	0
5.0 (92->)	Subtotal Recurring Investment Costs FY92->	2,203.60	3,757.30	3,237.50	4,944.10	5,192.70
5.1 (87-91)	Replacement Repair Costs FY87-91	0	0	0	0	0
5.1 (92->)	Subtotal Modifications Costs FY92->	2,203.60	3,757.30	3,237.50	4,944.10	5,192.70
5.1.1	Modification Kit Costs FY92->	2,148.40	3,606.90	2,658.30	3,596.20	3,885.80
5.1.2	Modification Spares Costs FY92->	55.2	150.4	579.3	1,347.80	1,307.00
5.1.3	Modification Installation Costs FY92->	183	65.6	265.9	120.9	338.1
5.2 (87-91)	Modifications Costs FY87-91	0	0	0	0	0
6.0	Subtotal Other Functions Costs	188	143	187.9	172.7	151.5
6.1	Navy Engineering and Technical Services (NETS) Costs	51.6	73.3	93	86.4	76.6
6.2	Contractor Engineering and Technical Services (CETS) Costs	38.2	33.2	56.1	61.6	54.2
6.3	Publications Costs	98.2	36.5	38.8	24.7	20.8
A.1	Total Aircraft Number	12	11	13	13	13
A.1.1	Regular Aircraft Number	12	11	13	13	13
A.1.2	FRS Aircraft Number	0	0	0	0	0
A.2	Total Flying Hours	6,642.00	6,196.00	5,614.00	5,532.00	4,729.00
A.2.1	Regular Flying Hours	6,642.00	6,196.00	5,614.00	5,532.00	4,729.00
A.2.2	FRS Flying Hours	0	0	0	0	0

FY94-95 HH-46D Data, Costs in $K, Escalated to FY00 Dollars

HH-46D Element #	Element Description	1994	1995	1996	1997	1998
1.0	Subtotal Organizational Costs	38,817.30	55414.7	58,878.50	64,322.30	70,984.10
1.1	Subtotal Organizational Personnel Costs	20,615.50	33610.5	32,208.30	43,876.30	43,609.50
1.1.1	Military Personnel Costs	20,615.50	33610.5	32,208.30	43,876.30	43,609.50
1.1.2	Civilian Personnel Costs	0	0	0	0	0
1.1.3	Contractor Personnel Costs	0	0	0	0	0
1.2	Subtotal Organizational Operations Costs	18,201.80	21804.2	26,670.20	20,446.00	27,374.60
1.2.1	Temporary Additional Duty Costs	154.60	323.6	251.3	223.8	1.6
1.2.2	Training Expendable Stores Costs	2,289.90	2332.1	2,766.60	0	0
1.2.3	Support Supplies Costs	4,526.80	4961.1	7,239.30	5,920.90	7,220.80
1.2.3.1	Contract Logistics Support Costs	0	0	0	0	0
1.2.3.2	Other Costs	0	0	0	0	0
1.2.4	AVDLR Costs	9,704.40	12876.7	14,953.40	12,725.60	18,339.40
1.2.4.1	Organic AVDLR Costs	9,704.40	12876.7	0	0	0
1.2.4.2	Commercial RoR Costs	0	0	0	0	0
1.2.5	Fuel Costs	1,526.10	1310.7	1,459.60	1,575.70	1,812.80
2.0	Subtotal Intermediate Costs	6,507.50	5478.9	4,230.60	4,781.10	4,440.90
2.1	Subtotal Intermediate Personnel Costs	6,507.50	5478.9	4,230.60	4,781.10	4,440.90
2.1.1	Military Personnel Costs	6,433.50	5394.2	4,142.40	4,679.60	4,318.30
2.1.2	Civilian Personnel Costs	59.30	79.7	83.1	94.9	116.4
2.1.3	Contractor Personnel Costs	14.70	5	5.1	6.6	6.2
3.0 (87-91)	Subtotal Depot Support Costs FY87-91	0	0	0	0	0
3.0 (92->)	Subtotal Depot Support Costs FY92->	6,823.30	8643.6	15,444.50	9,519.80	13,899.60
3.1 (87-91)	Subtotal Aircraft Rework Costs FY87-91	0	0	0	0	0
3.1 (92->)	Subtotal Aircraft Rework Costs FY92->	3,443.90	5265.5	9,069.90	0	10,280.00
3.1.1 (87-91)	Aircraft Rework Intra-DOD Costs	0	0	0	0	0
3.1.1 (92->)	Organic Aircraft Rework Costs FY92->	3,443.90	5265.5	9,069.90	5,898.30	10,280.00
3.1.1.1	Organic Aircraft Rework Units	4.40	6.3	9.1	14	8
3.1.2 (87-91)	Aircraft Rework Commercial Costs	0	0	0	0	0
3.1.2 (92->)	Commercial Aircraft Rework Costs FY92->	0	0	0	0	0
3.1.2.1	Commercial Aircraft Rework Units	0	0	0	0	0
3.1.3	DMISA Aircraft Rework Costs FY92->	0	0	0	0	0
3.1.3.1	DMISA Aircraft Rework Units	0	0	0	0	0

3.2 (87-91)	Subtotal Engine Rework Costs FY87-91	0	0	0	0	0
3.2 (92->)	Total Aircraft Rework Units	4.40	6.3	9.1	14	8
3.2.1	Engine Rework Intra-DOD Costs	0	0	0	0	0
3.2.2	Engine Rework Commercial Costs	0	0	0	0	0
3.3 (87-91)	Subtotal Component Rework Costs FY87-91	0	0	0	0	0
3.3 (92->)	Subtotal Engine Rework Costs FY92->	1,070.30	1052.1	2,059.60	446.1	958.5
3.3.1 (87-91)	Component Rework-DOD Costs	0	0	0	0	0
3.3.1 (92->)	Organic Engine Rework Costs FY92->	1,070.30	1052.1	2,059.60	446.1	958.5
3.3.1.1	Organic Engine Rework Units	21.70	15.7	37.8	7.5	10.5
3.3.2 (87-91)	Component Rework-Commercial Costs	0	0	0	0	0
3.3.2 (92->)	Commercial Engine Rework Costs FY92->	0	0	0	0	0
3.3.2.1	Commercial Engine Rework Units	0	0	0	0	0
3.3.3	DMISA Engine Rework Costs FY92->	0	0	0	0	0
3.3.3.1	DMISA Engine Rework Units	0	0	0	0	0
3.4 (87-91)	Subtotal Other Rework Costs 87-91	0	0	0	0	0
3.4 (92->)	Total Engine Rework Units FY92->	21.70	15.7	37.8	7.5	10.5
3.4.1 (87-91)	Other Rework - Miscellaneous Depot Costs	0	0	0	0	0
3.4.2 (87-91)	Other Rework - Engine Support Costs	0	0	0	0	0
3.5	Aircraft Support Services Costs FY92->	1,769.40	1452.1	3,773.40	2,573.80	1,912.50
3.5.1	Program Related Logistics Costs	0	0	0	0	0
3.5.2	Program Related Engineering Costs	0	0	0	0	0
3.6	Subtotal Aircraft Emergency Repair Costs FY92->	538.20	752.6	537.4	588.8	747.4
3.6.1	Organic Aircraft Emergency Repair Costs FY92->	482.00	685.9	478.7	541	0
3.6.2	Commercial Aircraft Emergency Repair Costs FY92->	55.00	54.4	29.3	34.7	747.4
3.6.3	DMISA Aircraft Emergency Repair Costs FY92->	1.20	12.3	29.4	13.1	0
3.7	Subtotal Engine Emergency Repair Costs FY92->	1.50	2.3	4.2	12.8	1.2
3.7.1	Organic Engine Emergency Repair Costs FY92->	0.30	0.3	1.6	3.4	0
3.7.2	Commercial Engine Emergency Repair Costs FY92->	0	0	0	0	1.2
3.7.3	DMISA Engine Emergency Repair Costs FY92->	1.20	2	2.6	9.4	0
3.8	Support Equipment Maintenance	0	119	0	0	0
4.0	Subtotal Training Support Costs	8,343.00	14551.2	15,292.40	9,448.60	11,656.00
4.1	Subtotal Fleet Readiness Squadron (FRS) Costs	7,845.70	13503.2	15,184.60	6,935.70	11,226.40
4.1.1	Subtotal FRS Personnel Costs	3,934.20	3801	1,912.10	0	2,323.90
4.1.1.1	FRS Military Personnel Costs	3,934.20	3801	1,912.10	0	2,323.90
4.1.1.2	FRS Civilian Personnel Costs	0	0	0	0	0

4.1.1.3	FRS Contractor Personnel Costs	0	0	0	0	0
4.1.2	Subtotal FRS Operations Costs	3,911.50	9702.2	13,272.50	6,935.70	8,902.50
4.1.2.1	FRS Temporary Additional Duty Costs	16.00	40.4	29.8	47.1	0
4.1.2.2	FRS Training Expendable Stores Costs	483.40	1011.4	1,395.80	0	0
4.1.2.3	FRS Support Supplies Costs	1,077.30	2419.7	4,148.50	2,329.50	2,412.50
4.1.2.4	FRS AVDLR Costs	2,020.00	5663.1	6,911.20	3,909.20	5,902.00
4.1.2.4.1	FRS Organic AVDLR Costs	2,020.00	5663.1	0	0	0
4.1.2.4.2	FRS Commercial RoR Costs	0	0	0	0	0
4.1.2.5	FRS Fuel Costs	314.80	567.6	787.2	649.9	588
4.2	Subtotal Operational/Maintenance Training Costs	497.30	1048	107.8	2,512.90	429.6
4.2.1	Operational Training Costs	0	0	29.4	0	2.8
4.2.2	Maintenance Training Costs	497.30	1048	78.4	2,512.90	426.8
5.0 (87-91)	Subtotal Recurring Investment Costs FY87-91	0	0	0	0	0
5.0 (92->)	Subtotal Recurring Investment Costs FY92->	6,059.90	11271.7	10,210.50	15,212.60	16,377.40
5.1 (87-91)	Replacement Repair Costs FY87-91	0	0	0	0	0
5.1 (92->)	Subtotal Modifications Costs FY92->	6,059.90	11271.7	10,210.50	15,212.60	16,377.40
5.1.1	Modification Kit Costs FY92->	5,908.00	10820.3	8,383.70	11,065.60	12,255.40
5.1.2	Modification Spares Costs FY92->	151.80	451.3	1,826.80	4,147.20	4,122.00
5.1.3	Modification Installation Costs FY92->	503.30	197.1	838.3	372	1,066.30
5.2 (87-91)	Modifications Costs FY87-91	0	0	0	0	0
6.0	Subtotal Other Functions Costs	309.20	348	509.1	480.7	432.8
6.1	Navy Engineering and Technical Services (NETS) Costs	142.30	220	293.4	266	241.6
6.2	Contractor Engineering and Technical Services (CETS) Costs	104.80	99.3	176.9	189.9	170.4
6.3	Publications Costs	62.10	28.7	38.8	24.8	20.8
A.1	Total Aircraft Number	33	33	41	40	41
A.1.1	Regular Aircraft Number	27	27	35	34	34
A.1.2	FRS Aircraft Number	6	6	6	6	7
A.2	Total Flying Hours	14,703.10	15217.8	18,151.00	17,775.80	19,969.00
A.2.1	Regular Flying Hours	12,086.60	10680.8	11,592.60	12,505.30	15,039.00
A.2.2	FRS Flying Hours	2,616.50	4537	6,558.40	5,270.50	4,930.00

NAVY VAMOSC (ATMSR) TABLE OF KEY PROCESSING CONSIDERATIONS/LIMITATIONS

1. Input data do not flow directly to the related output report elements without manual or automated preprocessing and allocation is required.

2. Input data received on listings or diskettes are key entered to processing site files.

3. Automated V&V includes edit checks during the production runstream and additional automated V&V of input data.

4. Data inputs, in most cases, are keyed either to UIC or TEC. Subordinate keys include AG/SAG, SSN, E/E, F/SF, MC, and TMS, as appropriate.

5. Two preprocessing routines for CNO FHP and training data are accomplished to overcome input data limitations related to weapon system (i.e. TEC) and activity (UIC) identification.

6. Most Marine Corps aviation personnel, aircraft, and operating costs are distributed to the Fleet Commanders because Fleet Marine Force (FMF) aviation units operate under Fleet Commander operational authority.

7. Intermediate level costs received for Naval Air Stations, Marine Corps Air Stations, and MALS are allocated to aircraft based on a data table cross-referencing bases (or MALS) to squadrons supported. Organizational level costs received for Naval Air Stations and Marine Corps Air Stations are allocated to the aircraft operated by the station.

8. ATMSR is constructed around squadron, base, and ship input cost data. Special functions and matrices have been developed to distribute aviation related O&S costs received from input for Wings, CNET squadrons, MALS, Detachments, ASOD/NSOD, and Training Wings.

9. Composite data is a collective term for source data other than CNO FHP and the CRP file.

10. Report production is currently a one-time annual batch process. Automated history files are used to produce special reports, as required.

11. Fleet Readiness Squadrons (FRS) are identified from a hard-coded table. FRS costs are identified as training costs and not regular operational costs. FRS costs are reported only for MC CINCLANTFLT and CINCPACFLT.

12. ATMSR is primarily oriented to squadrons and stations operating Navy and Marine Corps aircraft. However, aircraft O&S costs are also incurred and reported at the UIC

level for Wings, Detachments, and special purpose (Blue Angels, President's helo) aircraft.

13. Because source data are received at the UIC or TEC (T/M/S) level, special UIC and TEC summary files are established within the system to accommodate those data. Since aircraft flight hour data from the FHP does not specify individual UICs, the UIC summary files developed by a preprocessing routine (CRP file) serve that purpose.

14. Aircraft O&S costs reported under MC CNET are dedicated undergraduate pilot training costs. This includes training aircraft maintenance personnel costs.

15. Personnel costs for aviation capable ships company and aircraft carrier ship's company are contained in Navy VAMOSC-SHIPS reports.

16. The source for AVDLR costs is the CNO FHP. If aircraft maintenance for a TMS is performed under contract, AVDLR costs are generally subsumed in the contract amount and are not specifically reported by the ACC to the FHP.

17. TAD costs for intermediate level UICs are distributed to the organizational level to facilitate TMS identification.

APPENDIX B. MILITARY COMPOSITE STANDARD PAY AND REIMBURSEMENT RATES DEPARTMENT OF THE NAVY FOR FISCAL YEAR 2000

MILITARY PAY GRADE	AVERAGE BASIC PAY ALLOWANCE	ANNUAL DOD COMPOSITE RATE	ANNUAL RATE BILLABLE TO NON-DOD ENTITIELS 1/, 2/
O-10	$110,700 3/	$116,250	$176,225
O-9	110,700 3/	172,625	182,975
O-8	107,041	165,050	174,950
O-7	94,430	149,350	158,300
O-6	79,930	136,875	145,075
O-5	64,019	115,450	122,375
O-4	51,857	98,775	104,700
O-3	42,731	86,050	91,200
O-2	34,906	66,925	70,950
O-1	26,162	53,175	56,350
WO-5	------	-----	-----
WO-4	$51,235	$92,550	$109,200
WO-3	42,282	78,300	92,400
WO-2	35,805	69,175	81,650
WO-1	-----	-----	-----
CADETS	$7,200	$9,825	$11,600
E-9	$43,148	$76,600	$90,375
E-8	35,377	65,350	77,125
E-7	29,917	57,300	67,625
E-6	25,411	49,725	58,675
E-5	20,874	42,450	50,100
E-4	17,094	34,950	41,225
E-3	14,407	29,025	34,250
E-2	13,045	26,250	30,975
E-1	11,176	23,150	27,325

Notes: 1/ The annual rate billable to non-DOD entities includes applicable factors for other personnel support costs (6 percent for officers and 18 percent for enlisted personnel).

2/ To compute a Daily Rate, apply a factor of .00439. For an Hourly Rate, apply a factor of .00055.

3/ Basic pay for these officers is limited to the rate of basic pay for Level V of the Executive Schedule, which currently is $110,700 per year.

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APPENDIX C. HELICOPTER COMBAT SUPPORT MANNING REQUIREMENT

The table below calculates the average number of personnel for a typical HC squadron. The table incorporates the manning requirements from each HC squadron's Activity Manpower Document. The numbers of personnel by paygrade reflect both sea and shore billets.

	HC-3 (1)	HC-5 (2)	HC-6 (3)	HC-8 (4)	HC-11 (5)	Average
0-5	-	2	2	2	2	2
0-4	-	10	8	8	10	9
0-3	-	25	24	23	29	25
0-2	-	35	27	22	36	30
0-1	-		3	3	4	3
Warrant/LDO	-	9	4	3	6	6
E-9	-	2	2	2	2	2
E-8	-	3	2	2	2	2
E-7	-	19	9	12	10	13
E-6	-	64	40	34	43	45
E-5	-	114	84	88	101	97
E-4	-	90	46	44	60	60
E-3	-	107	70	53	82	78
TOTAL		480	321	296	387	371

(1) HC-3 Personnel Cost are Calculated within the VAMOSC Data
(2) HC-5 Activity Manpower Document, April 2000
(3) HC-6 Activity Manpower Document, August 1999
(4) HC-8 Activity Manpower Document, January 2000
(5) HC-11 Activity Manpower Document, January 2000

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APPENDIX D. REGRESSION ANALYSIS

Within this appendix are the results from the regression analysis. The regression was analyzed to determine if any relationship existed between the O&S cost of a CH-46 and the independent variables: quantity of aircraft, flight time, and time. Each independent variable was analyzed separately and in combinations with the others.

I. Model Form and Equation

Model Form: **Linear Model**
Number of Observations: 5
Equation in Unit Space: O&S = 155000.966 + -7070.7 * Quantity + 6.499 * Flt Hous + 2807.542 * Year

II. Fit Measures (in Unit Space)

Coefficient Statistics Summary

Variable	Coefficient	Std Dev of Coefficient	t-statistic (coeff/sd)	Significance
Intercept	155000.966	425223.013	0.365	0.7772
Quantity	-7070.700	18547.164	-0.381	0.7683
Flt Hous	6.499	9.573	0.679	0.6203
Year	2807.542	5297.345	0.530	0.6897

Goodness of Fit Statistics

Std Error (SE)	R-Squared	R-Squared (adj)	CV (Coeff of Variation)
7738.155	39.40%	-142.30%	18.20%

Analysis of Variance

Due to	Degrees of Freedom	Sum of Squares (SS)	Mean Squares (SS/DF)	F-statistic	Significance
Regression (SSR)	3	38975651.27	12991883.76	0.217	0.8790
Residuals (Errors) (SSE	1	59879047.91	59879047.91		
Total (SST)	4	98854699.18			

Pairwise Correlation Matrix

	O&S	Quantity	Flt Hous	Year
O&S	1.000	0.061	0.173	0.103
Quantity	0.061	1.000	0.970	-0.884
Flt Hous	0.173	0.970	1.000	-0.875
Year	0.103	-0.884	-0.875	1.000

III. Predictive Measures (in Unit Space)

Average Actual O&S	42594.900
Standard Error (SE)	7738.155
Coefficient of Variation	18.20%
Adjusted R-Squared	-142.30%

IV. Residual Analysis (in Unit Space)

Actual Y	Predicted Y	Residuals	Standard Residuals
36,540.50	39221.64	-2681.14	-0.35
50,400.30	45038.01	5362.29	0.69
41,609.00	42113.84	-504.84	-0.07
42,141.70	46494.31	-4352.61	-0.56
42,283.00	40106.69	2176.31	0.28

I. Model Form and Equation

Model Form: **Linear Model**

Number of Observations: 5

Equation in Unit Space: O&S = 253017.679 + -10015.146 * Quantity + 5.704 * Flt Hous

II. Fit Measures (in Unit Space)

Coefficient Statistics Summary

Variable	Coefficient	Std Dev of Coefficient	t-statistic (coeff/sd)	Significance
Intercept	253017.679	306425.635	0.826	0.4957
Quantity	-10015.146	14161.348	-0.707	0.5528
Flt Hous	5.704	7.566	0.754	0.5295

Goodness of Fit Statistics

Std Error (SE)	R-Squared	R-Squared (adj)	CV (Coeff of Variation)
6192.676	22.40%	-55.20%	14.50%

Analysis of Variance

Due to	Degrees of Freedom	Sum of Squares (SS)	Mean Squares (SS/DF)	F-statistic	Significance
Regression (SSR)	2	22156231.07	11078115.54	0.289	0.7760
Residuals (Errors) (SSE	2	76698468.11	38349234.05		
Total (SST)	4	98854699.18			

Pairwise Correlation Matrix

	O&S	Quantity	Flt Hous
O&S	1.000	0.061	0.173
Quantity	0.061	1.000	0.970
Flt Hous	0.173	0.970	1.000

III. Predictive Measures (in Unit Space)

Average Actual O&S	42594.900
Standard Error (SE)	6192.676
Coefficient of Variation	14.50%
Adjusted R-Squared	-55.20%

IV. Residual Analysis (in Unit Space)

Actual Y	Predicted Y	Residuals	Standard Residuals
36,540.50	42277.08	-5736.58	-0.93
50,400.30	44917.94	5482.36	0.89
41,609.00	39887.18	1721.82	0.28
42,141.70	45076.90	-2935.20	-0.47
42,283.00	40815.40	1467.60	0.24

I. Model Form and Equation

Model Form: **Linear Model**

Number of Observations: 5

Equation in Unit Space: O&S = -69439.849 + 3843.143 * Quantity + 2244.211 * Year

II. Fit Measures (in Unit Space)

Coefficient Statistics Summary

Variable	Coefficient	Std Dev of Coefficient	t-statistic (coeff/sd)	Significance
Intercept	-69439.849	228547.081	-0.304	0.7898
Quantity	3843.143	7904.561	0.486	0.6750
Year	2244.211	4471.495	0.502	0.6655

Goodness of Fit Statistics

Std Error (SE)	R-Squared	R-Squared (adj)	CV (Coeff of Variation)
6613.430	11.50%	-77.00%	15.50%

Analysis of Variance

Due to	Degrees of Freedom	Sum of Squares (SS)	Mean Squares (SS/DF)	F-statistic	Significance
Regression (SSR)	2	11379788.61	5689894.305	0.13	0.8850
Residuals (Errors) (SSE	2	87474910.57	43737455.29		
Total (SST)	4	98854699.18			

Pairwise Correlation Matrix

	O&S	Quantity	Year
O&S	1.000	0.061	0.103
Quantity	0.061	1.000	-0.884
Year	0.103	-0.884	1.000

III. Predictive Measures (in Unit Space)

Average Actual O&S	42594.900
Standard Error (SE)	6613.430
Coefficient of Variation	15.50%
Adjusted R-Squared	-77.00%

IV. Residual Analysis (in Unit Space)

Actual Y	Predicted Y	Residuals	Standard Residuals
36,540.50	40412.36	-3871.86	-0.59
50,400.30	42656.57	7743.73	1.17
41,609.00	44900.79	-3291.79	-0.50
42,141.70	43301.85	-1160.15	-0.18
42,283.00	41702.92	580.08	0.09

I. Model Form and Equation

Model Form: **Linear Model**

Number of Observations: 5

Equation in Unit Space: O&S = -5061.961 + 3.335 * Flt Hous + 3412.467 * Year

II. Fit Measures (in Unit Space)

Coefficient Statistics Summary

Variable	Coefficient	Std Dev of Coefficient	t-statistic (coeff/sd)	Significance
Intercept	-5061.961	50939.177	-0.099	0.9302
Flt Hous	3.335	3.612	0.923	0.4534
Year	3412.467	3824.685	0.892	0.4665

Goodness of Fit Statistics

Std Error (SE)	R-Squared	R-Squared (adj)	CV (Coeff of Variation)
5855.833	30.60%	-38.80%	13.70%

Analysis of Variance

Due to	Degrees of Freedom	Sum of Squares (SS)	Mean Squares (SS/DF)	F-statistic	Significance
Regression (SSR)	2	30273138.98	15136569.49	0.441	0.6940
Residuals (Errors) (SSE	2	68581560.2	34290780.1		
Total (SST)	4	98854699.18			

Pairwise Correlation Matrix

	O&S	Flt Hous	Year
O&S	1.000	0.173	0.103
Flt Hous	0.173	1.000	-0.875
Year	0.103	-0.875	1.000

III. Predictive Measures (in Unit Space)

Average Actual O&S	42594.900
Standard Error (SE)	5855.833
Coefficient of Variation	13.70%
Adjusted R-Squared	-38.80%

IV. Residual Analysis (in Unit Space)

Actual Y	Predicted Y	Residuals	Standard Residuals
36,540.50	39097.93	-2557.43	-0.44
50,400.30	44054.65	6345.65	1.08
41,609.00	44525.37	-2916.37	-0.50
42,141.70	45116.17	-2974.47	-0.51
42,283.00	40180.37	2102.63	0.36

I. Model Form and Equation

Model Form: **Linear Model**
Number of Observations: 5
Equation in Unit Space: O&S = 33373.087 + 336.563 * Quantity

II. Fit Measures (in Unit Space)

Coefficient Statistics Summary

Variable	Coefficient	Std Dev of Coefficient	t-statistic (coeff/sd)	Significance
Intercept	33373.087	87801.300	0.380	0.7293
Quantity	336.563	3203.062	0.105	0.9230

Goodness of Fit Statistics

Std Error (SE)	R-Squared	R-Squared (adj)	CV (Coeff of Variation)
5729.812	0.40%	-32.80%	13.50%

Analysis of Variance

Due to	Degrees of Freedom	Sum of Squares (SS)	Mean Squares (SS/DF)	F-statistic	Significance
Regression (SSR)	1	362477.813	362477.813	0.011	0.9230
Residuals (Errors) (SSE	3	98492221.37	32830740.46		
Total (SST)	4	98854699.18			

Pairwise Correlation Matrix

O&S	Quantity

O&S	1.000	0.061
Quantity	0.061	1.000

III. Predictive Measures (in Unit Space)

Average Actual O&S	42594.900
Standard Error (SE)	5729.812
Coefficient of Variation	13.50%
Adjusted R-Squared	-32.80%

IV. Residual Analysis (in Unit Space)

Actual Y	Predicted Y	Residuals	Standard Residuals
36,540.50	42796.84	-6256.34	-1.09
50,400.30	42796.84	7603.46	1.33
41,609.00	42796.84	-1187.84	-0.21
42,141.70	42460.27	-318.57	-0.06
42,283.00	42123.71	159.29	0.03

I. Model Form and Equation

Model Form: **Linear Model**

Number of Observations: 5

Equation in Unit Space: O&S = 36814.607 + 0.515 * Flt Hous

II. Fit Measures (in Unit Space)

Coefficient Statistics Summary

Variable	Coefficient	Std Dev of Coefficient	t-statistic (coeff/sd)	Significance
Intercept	36814.607	19111.509	1.926	0.1498
Flt Hous	0.515	1.688	0.305	0.7803

Goodness of Fit Statistics

Std Error (SE)	R-Squared	R-Squared (adj)	CV (Coeff of Variation)
5653.290	3.00%	-29.30%	13.30%

Analysis of Variance

Due to	Degrees of Freedom	Sum of Squares (SS)	Mean Squares (SS/DF)	F-statistic	Significance
Regression (SSR)	1	2975635.638	2975635.638	0.093	0.7800
Residuals (Errors) (SSE	3	95879063.54	31959687.85		
Total (SST)	4	98854699.18			

Pairwise Correlation Matrix

	O&S	Flt Hous

O&S	1.000	0.173
Flt Hous	0.173	1.000

III. Predictive Measures (in Unit Space)

Average Actual O&S	42594.900
Standard Error (SE)	5653.290
Coefficient of Variation	13.30%
Adjusted R-Squared	-29.30%

IV. Residual Analysis (in Unit Space)

Actual Y	Predicted Y	Residuals	Standard Residuals
36,540.50	43108.98	-6568.48	-1.16
50,400.30	43347.53	7052.77	1.25
41,609.00	42893.11	-1284.11	-0.23
42,141.70	42457.23	-315.53	-0.06
42,283.00	41167.65	1115.35	0.20

I. Model Form and Equation

Model Form: **Linear Model**
Number of Observations: 5
Equation in Unit Space: O&S = 41626.98 + 322.64 * Year

II. Fit Measures (in Unit Space)

Coefficient Statistics Summary

Variable	Coefficient	Std Dev of Coefficient	t-statistic (coeff/sd)	Significance
Intercept	41626.980	5988.742	6.951	0.0061
Year	322.640	1805.674	0.179	0.8693

Goodness of Fit Statistics

Std Error (SE)	R-Squared	R-Squared (adj)	CV (Coeff of Variation)
5710.042	1.10%	-31.90%	13.40%

Analysis of Variance

Due to	Degrees of Freedom	Sum of Squares (SS)	Mean Squares (SS/DF)	F-statistic	Significance
Regression (SSR)	1	1040965.696	1040965.696	0.032	0.8700
Residuals (Errors) (SSE)	3	97813733.48	32604577.83		
Total (SST)	4	98854699.18			

Pairwise Correlation Matrix

	O&S	Year

O&S	1.000	0.103
Year	0.103	1.000

III. Predictive Measures (in Unit Space)

Average Actual O&S	42594.900
Standard Error (SE)	5710.042
Coefficient of Variation (	13.40%
Adjusted R-Squared	-31.90%

IV. Residual Analysis (in Unit Space)

Actual Y	Predicted Y	Residuals	Standard Residuals
36,540.50	41949.62	-5409.12	-0.95
50,400.30	42272.26	8128.04	1.42
41,609.00	42594.90	-985.90	-0.17
42,141.70	42917.54	-775.84	-0.14
42,283.00	43240.18	-957.18	-0.17

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